

modern machine shop

EPOXY DIES

See Page 128

FLOTURNING JET
ENGINE PARTS

See Page 136

AUTOMATION IN
INDUSTRY

See Page 158

JANUARY
1956

NORMA-HOFFMANN Roller Bearings

Interchangeable


with Single-Row Ball Bearings give
maximum capacity in minimum space

Full line contact of rolling surfaces provides far greater radial load capacity than ball bearings and ability to absorb vibration, overload and shock. Use these bearings for high or low speeds.

NORMA-HOFFMANN BEARINGS CORP.
STAMFORD, CONN.
Founded 1911



FIELD OFFICES: Atlanta, Chicago, Cincinnati,
Cleveland, Dallas, Denver, Detroit, Kansas City,
Los Angeles, San Francisco, Seattle



"Cleartex helps us hold to close tolerances"

—says Mr. Jack J. Waldman
Plant Manager,
Joseph Waldman & Sons,
Irvington, New Jersey

HERE's a plant that specializes in machining and threading intricate parts for the Watch and Aircraft Industries—working to very close tolerances. Mr. Waldman tells how Texaco helps:

"Our automatic screw machines are called upon to do some mighty accurate machining. We're glad we followed our Texaco Lubrication Engineer's recommendation and are using *Texaco Cleartex Oil* as both a cutting fluid and a machine lubricant. We find we get more pieces per tool grind, better finish, and lower unit costs. In addition, our machines are as clean as you'll find anywhere."

Regardless of the metal being worked, or the method of machining it, there is a *Texaco Cutting, Grinding or Soluble Oil* to help you do your jobs better, faster and at lower cost. A Texaco Lubrication Engineer will gladly give you full particulars.

Just call the nearest of the more than 2,000 Texaco Distributing Plants in the 48 States or write The Texas Company, 135 East 42nd Street, New York 17, N. Y.



TEXACO

CUTTING, GRINDING,
SOLUBLE AND
HYDRAULIC OILS

JANUARY

1956

Vol. 28

No. 8

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modern machine shop

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RICHARD S. KLINE, *General Manager*
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ROBERT I. SHORE, *Managing Editor*
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GILBERT C. CLOSE, *Contributing Editor*

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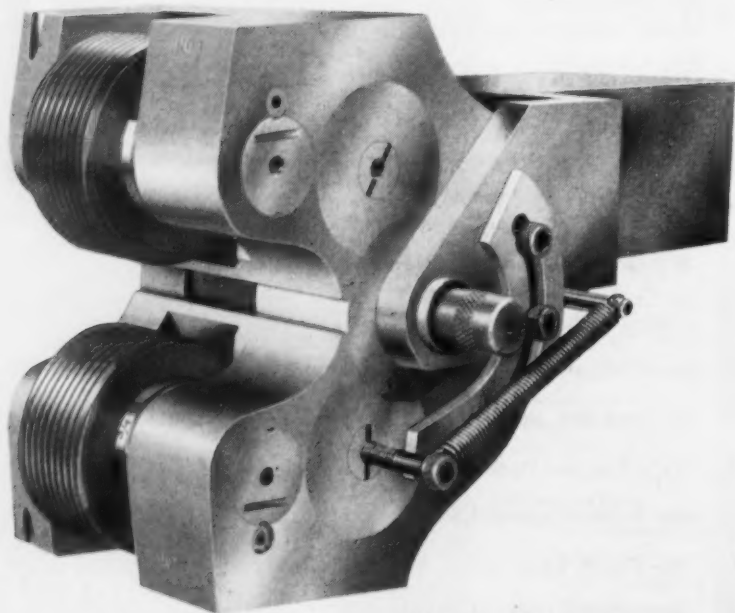
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Published monthly and copyrighted (1955) by Gardner Publications, Inc., 431 Main St., Cincinnati 2, O.
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(For more information on cover advertisements, use Reader Service Cards)



Coarse Pitch Threads Rolled to Class 4 Fit

The LANROLL Thread Rolling Attachments offer features designed to ensure greater accuracy, flexibility and economy when producing threads. . . .

1. **PERFECT HELIX AGREEMENT** allows rolling coarse pitch threads to Class 4 tolerances with long roll life. Threads can also be rolled directly to a shoulder with safety.
2. **ADJUSTABLE DESIGN** provides wide range coverage for each attachment size without loss of rigidity.
3. **SUITABLE SIZES** of LANROLL Attachments have been designed for all types and sizes of automatic screw machines and turret lathes with power feed.
4. **RAPID AND PRECISE SET-UPS** are possible with special gaging methods de-

signed for easy use and the elimination of "cut-and-try" set-ups.

5. Five sizes of Attachments roll a wide range of threads:

#14—#5 to $\frac{3}{8}$ "; #18—#5 to $\frac{1}{2}$ ";
 #20— $\frac{3}{8}$ " to 1"; #22— $\frac{5}{8}$ " to $1\frac{1}{4}$ ";
 #24— $\frac{3}{4}$ " to $1\frac{3}{4}$ "

Other outstanding advantages of these LANROLL Attachments include: large diameter rolls for longer roll life; taper correction; and excellent thread finish and microstructure. For additional information ask for Bulletin G-96—please send specifications when writing.

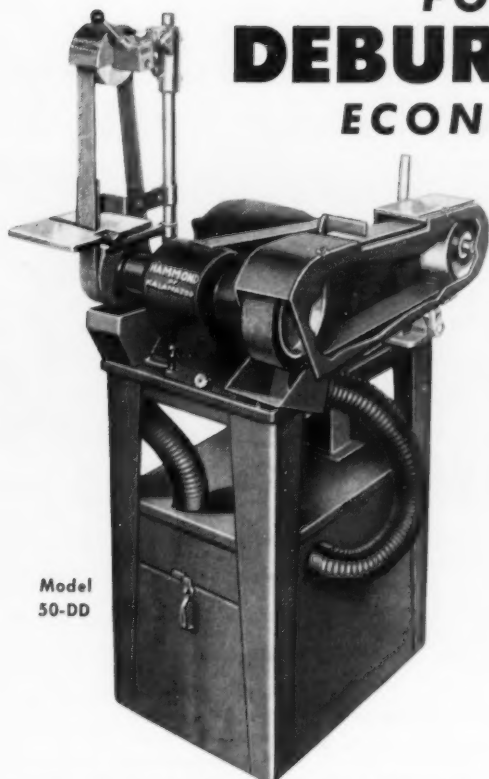
LANDIS Machine COMPANY

WAYNESBORO • PENNSYLVANIA • U.S.A.

For more data circle 201 on Reader Service Card

Hammond
OF KALAMAZOO

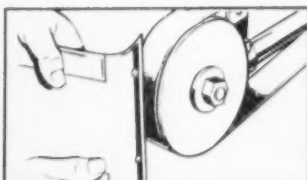
FOR
DEBURRING
ECONOMY



Model
50-DD

It is remarkable how soon these Abrasive Belt Machines pay for themselves in grinding, polishing and deburring.

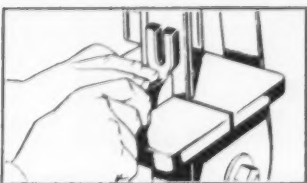
11 combinations available with or without Duskolector.



CONTACT WHEEL



IRREGULAR SHAPES



FLAT WORK

Hammond Machinery Builders INC.

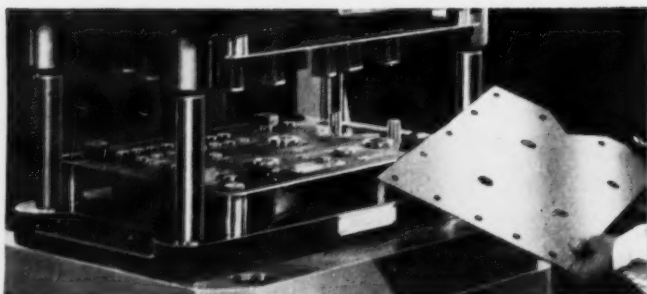
1615 DOUGLAS AVENUE KALAMAZOO, MICHIGAN

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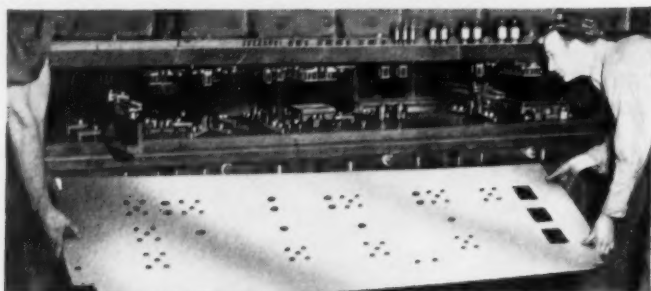
*"Clip" this ad
to your letterhead.
20 page catalog will
be sent at once.*

**OVER
2,000
PLANTS**

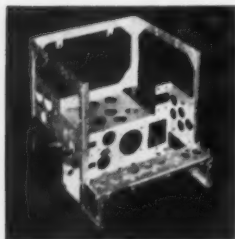
*are making up
their Metal
Perforating Die
Sets by Whistler
methods*



WHISTLER **MAGNETIC PERFORATING** DIES



WHISTLER **ADJUSTABLE PERFORATING** DIES



- Lower die-making costs.
- Start production quicker.
- Save work handling labor.
- Increase press production.
- Versatile in job application.
- Perforate materials to $\frac{1}{8}$ " thick mild steel.
- Combine horizontal and vertical perforating operations.
- Work in practically any size or type of press.
- All parts re-usable and interchangeable.
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- Parts interchangeable right in the press.
- Magnetic dies assembled on templates.
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- Save floor and storage space.
- Die investment not "tied up."

SEE FOR YOURSELF *Without Obligation*



Our illustrated Catalogs show the simplicity, economy and versatility of Whistler methods. See for yourself why Whistler customers are the biggest names in industry.

**WHISTLER DIES
ARE CUTTING
COSTS FROM
COAST TO COAST**

S. B. WHISTLER & SONS, INC.

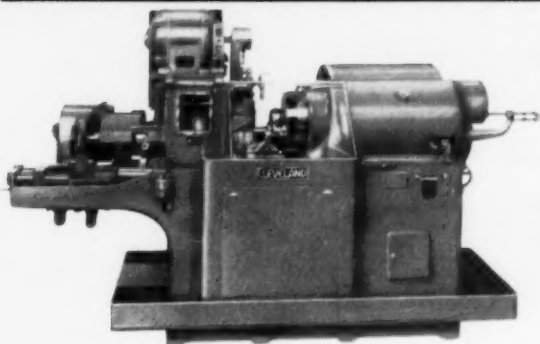
740 Military Road

Buffalo 23, New York

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new CLEVELAND

2 1/2" MODEL "AW" SINGLE SPINDLE AUTOMATIC



CUTS YOUR COSTS 3 WAYS!

More than 65 years of automatic screw machine design experience has been engineered into this new Model "AW" Cleveland. Its many modern features will enable your shop to set new economy records for fast, accurate production of turned and formed parts . . . and you save three ways:

YOU SAVE ON BASE PRICE

Your savings start at the first cost, as the 2 1/2" Model "AW" is offered at a base price of \$3500 to \$4000 less than other comparable automatics!

YOU SAVE ON SET-UP TIME

Such features as universal camming . . . rapid hand crank stock feed adjustment . . . quick change collar pads . . . maximum accessibility for tooling . . . make this Cleveland quick to set-up and exceptionally economical to operate. Spindle speeds range from 69 to 1920 rpm, providing efficient cutting speeds for all types of materials and tools. Four full automatic speed changes are available. Gear changes are quickly made.

YOU SAVE ON MAINTENANCE AND FREEDOM FROM DOWNTIME

Simplicity is the keynote of this Cleveland design. Completely free from complex mechanism and controls requiring constant attention or adjustments, this rugged, fool-proof automatic will assure the user dependable day-in, day-out performance!

To find out how much this new Cleveland can save you on your parts production, ask your Cleveland representative to submit a cost proposal with production estimates based on prints or samples of your work. There is no obligation.

Several examples of typical Model "AW" production are shown here. Note the profitable production rates the variety of operations performed with simple tooling.

Material: 24ST Aluminum
Operations: Drill (2);
C bore, Bore, Face;
Form (2); Cut-off.
Production: 62
pieces/hr.

Material: SAE 2317
Operations: Drill (2);
C bore, Top, Face;
Form (2); Cut-off.
Production: 41 pieces/hr.

Material: FM Brass
Operations: Drill (2);
Thread; Bore; Form;
Knurl; Cut-off.
Production: 110
pieces/hr.

Material: SAE 4615
Operations: Turn; Form (2);
Thread; Center; Face;
Chamfer; Cut-off.
Production: 36
pieces/hr.

Material: 24ST Aluminum
Operations: Drill (2); C bore;
Chamfer; Face (2); Form (2);
Cut-off. Production:
80 pieces/hr.



Write for this new
bulletin for full details
on the 2 1/2" Model
"AW" Cleveland

Remember: *Clevelands Cut Costs*

THE CLEVELAND AUTOMATIC MACHINE COMPANY

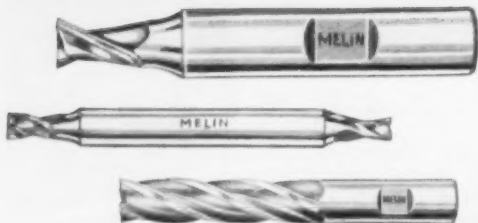
Manufacturers of a Complete Line of Single Spindle Automatic Screw Machines and High Pressure Hydraulic Die Casting Machines

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**4940 Beech Street
Cincinnati 12, Ohio**
SALES OFFICES: CHICAGO
CLEVELAND • DETROIT
HARTFORD • S. ORANGE



MELIN END MILLS



Representatives in principal cities.



**MELIN TOOL
COMPANY, INC.**

3373 West 140th Street
Cleveland 11, Ohio



There is a difference
in end mills . . .
MELIN end mills!
Proof of this
is evident in the
continued increase
in MELIN popularity.
The growth in
MELIN tool acceptance
was by no means an
accident
. . . The secret
is in **CONSISTENT
QUALITY.** This
standard of Quality
assures you better
performance . . .
longer lasting
performance . . .
CONTINUOUSLY . . .
from one shipment to
another.
Next time you order
end mills . . .
specify the finest . . .
specify MELIN.

**MANUFACTURED IN
TWO, THREE AND FOUR
FLUTE TYPES.**

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NO OTHER DRILL IN ITS RANGE GIVES YOU SO MUCH FOR THE PRICE!

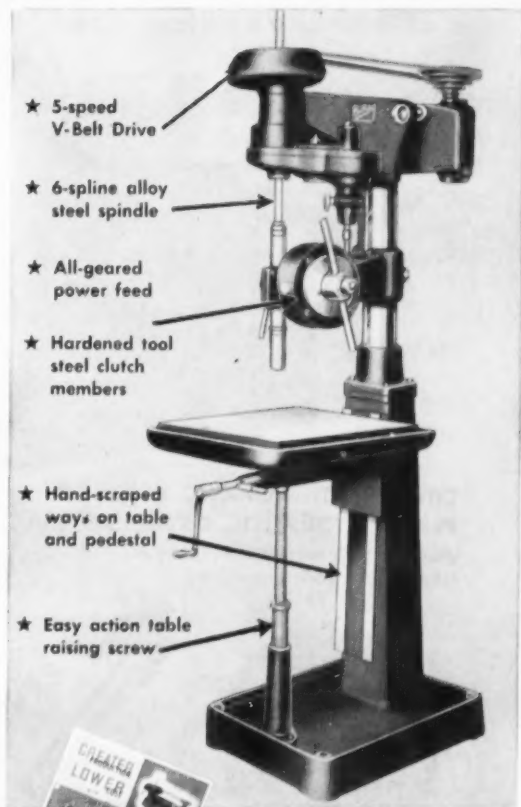
"Buffalo"

No. 16 DRILL

"Proven in Production"

Check price, design, and standard of construction — you'll find this $\frac{7}{8}$ " capacity drill a top value. No, you won't find fancy chrome trim or cost-hiking gadgets — but soundly engineered features like those shown here — features that make drilling easier, that promote accurate work and that add years to the drill's useful life. In short, features that cut your drilling costs.

Write today for details, including Bulletin 2730G, and see why more and more users every day are calling the "Buffalo" No. 16 their best buy!



Above, No. 16 Pedestal Drill with 12" overhang and power feed. Price on request.



BUFFALO FORGE COMPANY

388 Broadway

Buffalo, N. Y.

Canadian Blower & Forge Co., Ltd., Kitchener, Ont.

DRILLING

PUNCHING

SHEARING

BENDING

For more data circle 206 on Reader Service Card

January, 1956

modern machine shop 7

You're Sure of Precision and

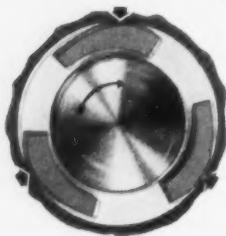
with

NEW

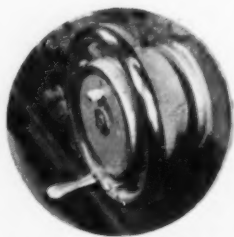


**CINCINNATI FILMATIC 6\"R x 18\"
PLAIN HYDRAULIC GRINDING MACHINE**

equipped with automatic push-button
infeed and electric gage sizing



**Automatic Grinding Wheel Balancing and
FILMATIC Grinding Wheel Spindle Bearings**
are standard equipment. (Filmatic principle illustrated at the
left.) These two cost-reducing features alone are reason
enough to choose Cincinnati.



**High degree of accuracy is
easier to obtain than ever be-
fore because of the new infeed
unit.**



CINCINNATI

Production

Cincinnati Filmatic Plain Hydraulic Grinders

Speculation in precision and production has no place in today's metalworking shops. You can quickly end the guesswork where it hurts most... in your precision cylindrical work. Just install new CINCINNATI FILMATIC Plain Hydraulic Grinders in your shop and you'll have definite production that you can count on year after year, and within closer limits of accuracy than ever before. ¶ Sev-

eral Cincinnati features that help you attain these highly desirable results are illustrated below. These and many other features, translated into benefits for your shop, are outlined in two attractive catalogs: G-660 for the 6"R and 10"L machines; G-661 for the 10"R and 14"L machines. Write for copies.

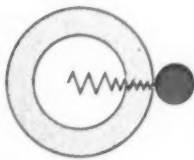
CINCINNATI GRINDERS INCORPORATED
CINCINNATI 9, OHIO

Members of this family group of CINCINNATI FILMATIC Plain Hydraulic Grinding Machines are:

Size	Between-Center Lengths	Catalog
6"R } 10"L }	18" and 30"	G-660
10"R } 14"L }	18", 36", 48" 72" and 96"	G-661



Automatic electric gage sizing (extra) includes an exclusive Cincinnati advantage... automatic compensation for wheel wear and truing.



Gap eliminator... greatly reduces time spent in "cutting air" during automatic infeed grinding operations. (extra)



**CENTERTYPE GRINDING MACHINES • CENTERLESS GRINDING MACHINES
CENTERLESS LAPPING MACHINES • MICRO-CENTRIC GRINDING MACHINES**

For more data circle 208 on Reader Service Card

Compare this latest jig borer for
capacity
accuracy
speed!



New **KNIGHT'S**
Jigmaster

Last word in medium size jig borers
 —unequalled for extreme accuracy,
 capacity, increased output.

The totally enclosed spindle and quill mounted on super-precision ball bearings, with quill moving in a solid bearing . . . the extra-wide base and reinforced column, both cast as a single unit . . . the wider bearing surfaces . . . all contribute to the Jigmaster's exceptional rigidity and accuracy.

Any one of three table and saddle locating devices may be used for hole location. All machine controls can be operated from a single convenient location.

**Write for
 Complete Information**

SPECIFICATIONS

Table Size	18" x 24"
Table Travel—Longitudinal	20"
—Cross	15"
Vertical Capacity	23"
Throat	20"
Weight	7500 Lbs.



W. B. KNIGHT MACHINERY COMPANY
 3922 West Pine Blvd.
 St. Louis 8, Mo.

For more data circle 209 on Reader Service Card



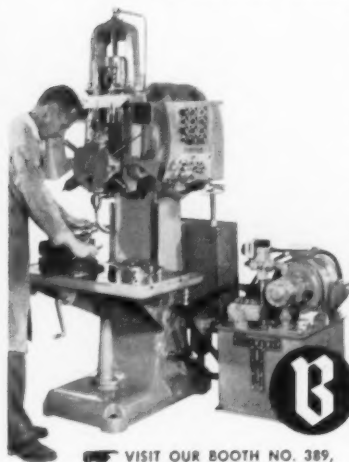
IDEALLY SUITED TO AUTOMATION

here's why

simple controls • automatic cycling (easily tied in with auto index tables, positioning tables and index fixtures) • quick setup • infinitely variable preselective feeds • preselective spindle speeds • preselective, extremely accurate depth control • preselective length of rapid approach • 8" stroke • $\frac{1}{4}$ " drill capacity in mild steel • all controls within easy reach of the operator • little floor space required • performs any second operation • extremely accurate relationship of one spindle to another • simple jigs required.

BURGMASER® (2BH) HYDRAULIC AUTOMATIC TURRET DRILL

with power indexing



The Burgmaster Turret Drill is designed to eliminate a large part of the wasteful handling which consumes as much as 50% of machining time. In one highly versatile machine, drilling, reaming, counterboring, countersinking, spotfacing, tapping, O. D. threading and numerous other second operations are accomplished by one operator. The cost cutting ability of this machine is particularly apparent where several of these operations have to be performed in one hole.

Burgmasters are available in 6 spindle manual; 6 and 8 spindle hydraulic automatic.

Write Dept. MM-1 for information

BURG TOOL Manufacturing Company, Inc.
15001 S. Figueroa Street, Gardena, California

Sales Offices:

NEW YORK

Burgmaster Eastern Sales Division, 15 W. 44th Street, MU 2-7276

CHICAGO

Burgmaster Machinery Company, 5329 Lincoln Ave., UP 8-7161

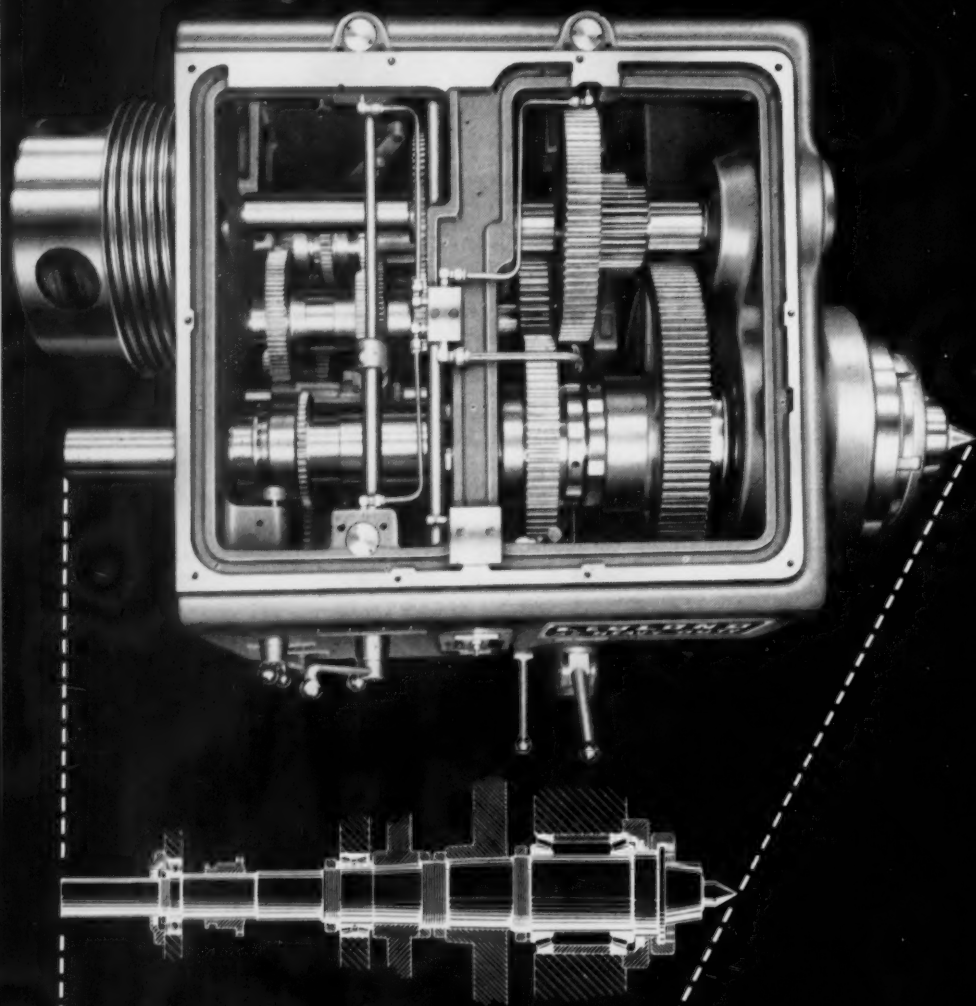
SAN FRANCISCO BAY AREA

Paul A. Kulju, 857 Estabrook St., San Leandro, LO 9-2244

VISIT OUR BOOTH NO. 389,
ASTE INDUSTRIAL EXPOSITION
CHICAGO INTERNATIONAL
AMPHITHEATRE, MARCH 19-23

For more data circle 210 on Reader Service Card

Designing LeBlond lathes for



Take a look inside the new LeBlond headstock — designed from the ground up to deliver high horsepower effectively.

TH
WO

60-HP turning was an inside job

This new headstock is the power secret of the LeBlond 32" Heavy Duty.

Notice how short and heavy the shafts are—to minimize deflection. Look at the fine-pitched, wide gears—for better tooth action and greater load-carrying capacity. They're hardened and ground for all speeds except low back gear. Free-running spur gear design assures minimum no-load friction horsepower. Shafts and gears not needed for a given speed remain idle, do not consume any power. The new 4-bearing spindle gives maximum rigidity, has twin Timkens at front, double-row Timken at center, ball bearing at rear.

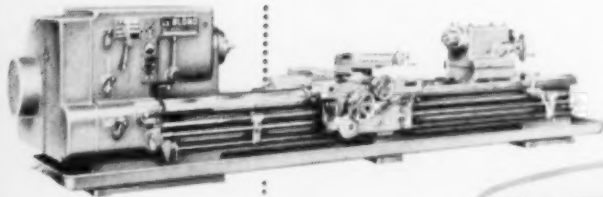
Of all the lathes in the world, the LeBlond 32" Heavy Duty was selected by a leading manufacturer of carbide tools, to be modified for grueling laboratory tests. Using 125 hp drive,

cuts were made with a measured 118 hp at the tool—210 cubic inches of SAE 1045 removed per minute!

Results like this call for a machine built in every detail for high-horsepower turning. The new headstock design is typical of the engineering in every element of the new LeBlond 32" Heavy Duty. The totally-enclosed quick change box, the hardened rack, 4-directional power rapid traverse, hardened and ground steel bedways, thrust-lock tailstock.

Whatever your turning needs—high power or high production, small swing or large—LeBlond makes a lathe you can trust with the job. 76 different models to choose from. Today, see your LeBlond Distributor or write—

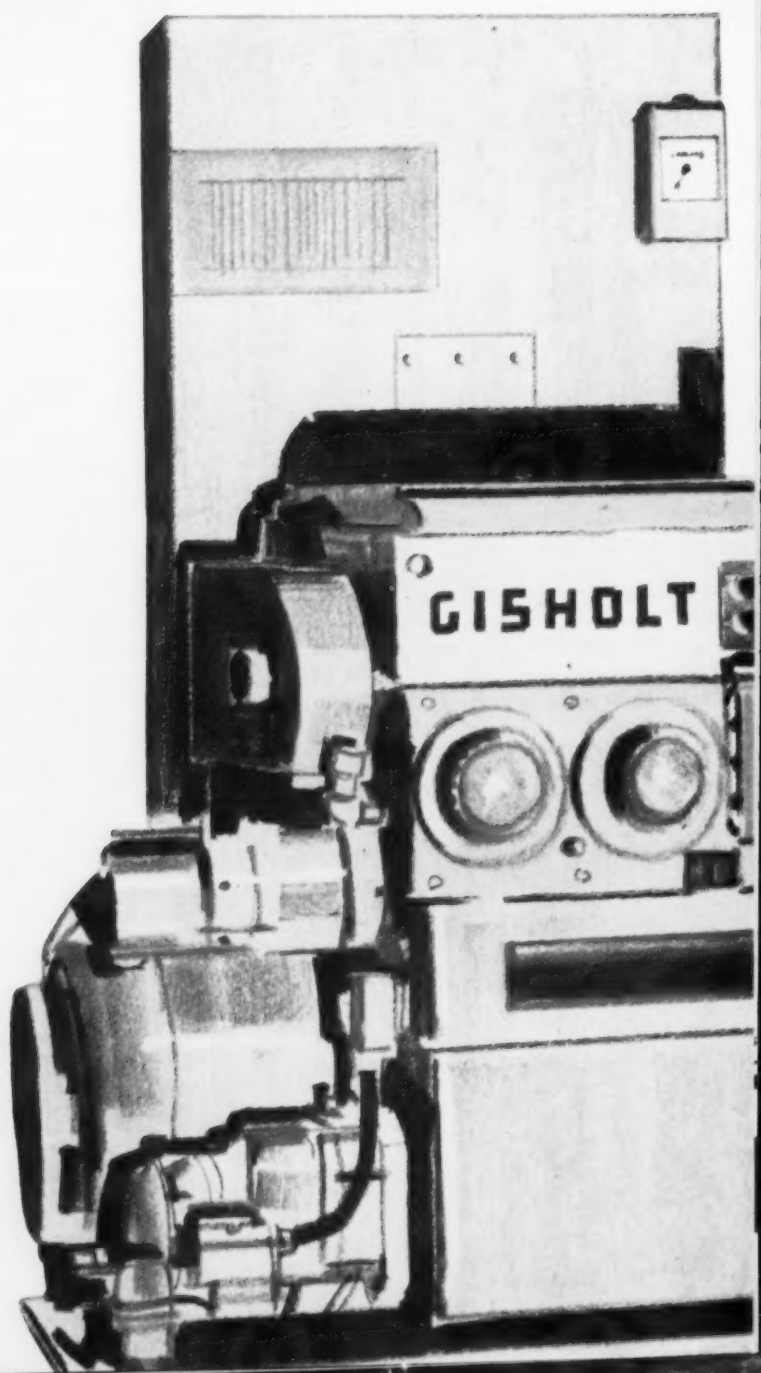
New adjustable acceleration brings heavy work pieces up to speed safely; any percentage of full torque can be selected for the first five seconds. Similar adjustments for stopping and jogging. 36 speeds from 4.5 to 500 rpm. Write for Bulletin HD-165.



...cut with confidence

LEBLOND
of Cincinnati

THE R. K. LEBLOND MACHINE TOOL COMPANY, CINCINNATI 8, OHIO
WORLD'S LARGEST BUILDER OF A COMPLETE LINE OF LATHES • FOR MORE THAN 69 YEARS



GISHOLT MASTERLINE NO. 12 AUTOMATIC PRODUCTION LATHE



Sixty-nine years of machine tool experience have gone into this latest design of the Gisholt MASTERLINE No. 12 Automatic Production Lathe. An important contribution to metal-cutting progress, it is ready to produce faster, better and at lower cost—with even less requirements for operator skill and effort. May we tell you the complete facts about it—and how it may be profitably applied to your manufacturing processes?

Gisholt Machine Company, Madison 10, Wisconsin
Look ahead—keep ahead—with Gisholt





SMITH

NOW MADE

manufactured

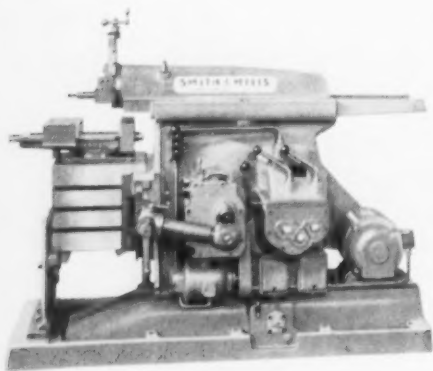


QUALITY SHAPERS

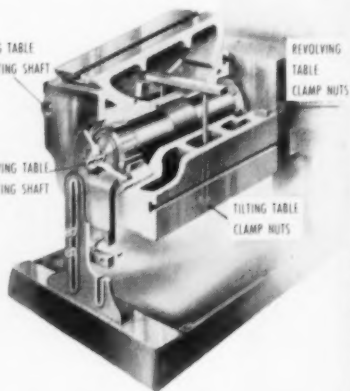
Smith & Mills shapers have been recently redesigned and improved. The engineering, quality control and manufacturing supervision to which they will be subjected assure you of continued high quality.

PROMPT SERVICE

The large Cincinnati plant in which Smith & Mills shapers are now being built—is equipped with modern equipment and staffed with skilled machinists and assembly technicians . . . offering prompt service.



STANDARD MODEL—Plain Table



UNIVERSAL TABLE

For more data circle 216 on Reader Service Card

SMITH & MILLS SHAPERS

IN CINCINNATI...

sold and serviced by Nebel Machine Tool Corp.

Smith & Mills shapers—one of the oldest and best known—are now being built in Cincinnati under the engineering and manufacturing supervision of the Nebel Machine Tool Corp., one of the most respected machine tool builders.

This association of Smith & Mills with Nebel assures quality shapers, prompt shipments and dependable service for Smith & Mills customers past, present and future.

Nebel's staff is being enlarged by the addition of key Smith & Mills engineering and management personnel.

The plant and equipment in which Smith & Mills shapers are now being built is large, modern and equipped to produce quality machine tools.

Smith & Mills shapers are available in Heavy Duty Models in 16", 20", 25", 28", 32" and 36" strokes, and Standard Duty Models in 20" and 24" strokes. Smith & Mills shapers can be furnished with plain, universal or revolving tables in all sizes.

Inquiries for Smith & Mills shapers, repair parts and service should be directed to the address shown below.

The tradition established by Smith & Mills in 1888 as manufacturers of fine shapers will be continued and expanded under the new ownership and management.

Write us today for complete information including prices and delivery.

PLAIN TABLE AND UNIVERSAL TABLE MACHINES

SIZE OF MACHINES	16" HVY.	20" STD.	20" HVY.	24" STD.	25" HVY.	28" HVY.	32" HVY.	36" HVY.
RAM								
Extreme Length of Stroke	17"	21"	21"	25"	26"	29"	33"	37"
Strokes per Minute	11-149	11-149	10-133	10-133	8-114	8-114	8-106	8-106
Speeds	8	8	8	8	8	8	12	12
Ram Bearing in Column	33 1/2" x 10 1/2"	33 1/2" x 10 1/2"	38" x 11 1/2"	38" x 11 1/2"	43" x 12 1/2"	43" x 12 1/2"	48" x 13 1/2"	48" x 13 1/2"
TOOL HEAD								
Vertical Travel	7"		8"		8 1/2"		9"	
Size of Tools	3/4" x 1 3/4"		7/8" x 1 7/8"		1" x 2"		1" x 2"	
FEEDS								
No. of Feeds	10		15		15		15	
Feed Range	.010" to .100"		.010" to .150"		.010" to .150"		.010" to .150"	
WISE-SINGLE SCREW								
Size of Jaws	12" x 2 1/2"		13" x 3"		13" x 3"		15" x 3 1/2"	
Opening	13 1/2"		16"		16"		16 1/2"	
MOTOR DRIVE								
Speed of Drive Shaft	350 R.P.M.		350 R.P.M.		350 R.P.M.		425 R.P.M.	
Motor Horsepower								
1800 R.P.M. constant	3-5		5-7 1/2		7 1/2-10		10	

SMITH & MILLS SHAPER DIV., NEBEL MACHINE TOOL CORP., 3401 Central Parkway, Cincinnati 25, Ohio

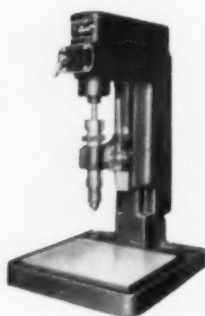
January, 1956

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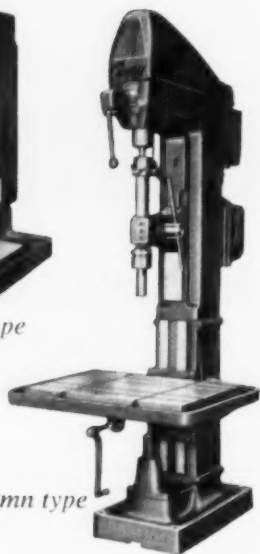
► The many features of our standard drilling and tapping machines can be combined in more than 100,000 different ways—and one of those combinations exactly meets your requirements.

Capacities in cast iron from very small numbered drills to 2"; No. 32 Jacobs chuck to No. 4 Morse taper.

Six or 8 speeds up to 12,000 rpm; 4 feeds.



Bench type



Column type

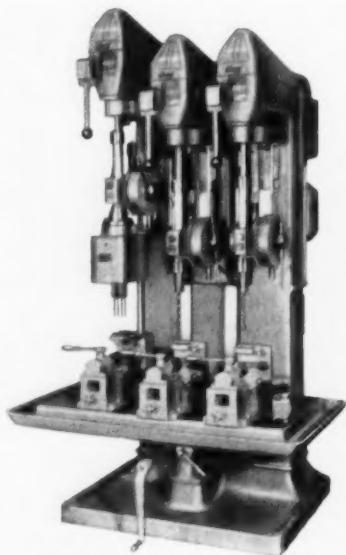
Avey has the right one

Column or bench type, with wide range of swing, 1 to 8 spindles.

All of our standard drilling and tapping machines include such bonus features as micrometer stop collar, telescoping spindle guard, dynamically-balanced rotating parts, rack-and-pinion-operated motor plate, and our rugged, involute spindle construction.

Tool and die shops like the versatility, accuracy, and speed of our Tool Room machines. They're available with No. 2, 3, or 4 Morse taper. You select the table you need: large (34" x 25"), round (18" diameter), or compound (25" x 12").

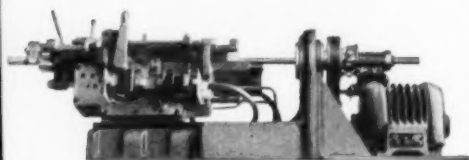
Ask for our literature; or, better yet, ask our representative to help you select the pay-off combination.



Multi-spindle



Cam feed unit



Avey-draulic

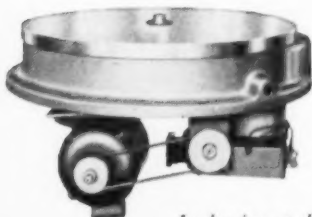


drilling, tapping, production machines

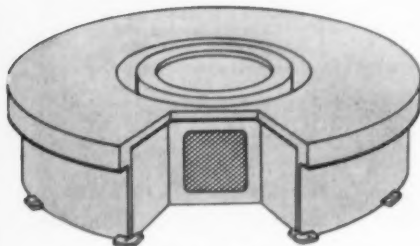
Sharp reductions in unit costs, floor space, machine-handling time, and operating time often make our high-production machines smart investments with fast pay-off periods. They have repeatedly proved this in some of the finest automatic lines in the country.

Our standard units can be combined for either rotary or linear operations. They can be economically re-engi-

for Avey makes them all



Indexing table



Standard base

neered for successive jobs.

Automatic cam feed units, for drilling, tapping, reaming, hollow milling. Vee belt or gear drive. No. 1, 2, or 3 Morse taper. Mount at any angle. Fully or semi-automatic. Tamper-proof.

Avey-draulic feed unit. Automatic withdrawal for chip removal only when necessary during deep hole drilling. Rapid advance, feed, and rapid return. Standard strokes 12" up to 30."

Automatic index tables. Rapid, accurate indexing to .001", 3 to 100 stations. Even or uneven index patterns. 16" to 48" diameter.

Steel bases. Stress relieved, sand-blasted, machined, and painted to fit your application.

Send us a print of your part, and ask for a profit prediction.

THE AVEY DRILLING MACHINE COMPANY
CINCINNATI 1, OHIO

For more data circle 218 on Reader Service Card

LOOK AT THIS UP-TO-THE-MINUTE EXHIBIT OF

POPE PRECISION SPINDLES

EXHIBIT A

POPE SUPER-PRECISION, HEAVY DUTY BORING SPINDLES for boring holes round within millionths of an inch. Available in both belt driven and motorized units to meet a wide range of speeds and horsepower. Send us your specifications for quotations.

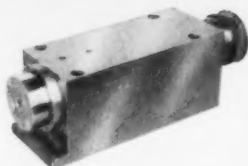


EXHIBIT B



POPE 1 HP, TOTALLY ENCLOSED 3600 RPM MOTORIZED, CARTRIDGE TYPE PRECISION SPINDLES with double row cylindrical roller bearings and separate thrust bearings for no endwise movement of the shaft

EXHIBIT D



POPE

HEAVY DUTY,
¾ TO 100 HP
DIRECT
MOTORIZED
SPINDLES

for Horizontal or Vertical Skin Milling, Grinding, Milling, Boring and Other Operations

EXHIBIT F



POPE HEAVY DUTY VEE-BELT DRIVEN, PRECISION MILLING SPINDLES, and Wheel Heads, ½ to 50 HP

EXHIBIT C



NEW **POPE** QUICK, SELF-REMOVING WHEEL HOLDER

for surface grinders and tool and cutter grinders — eliminates the necessity of a wheel puller. Write for quotations.

EXHIBIT E



POPE SUPER-PRECISION MOTORIZED TOOL AND CUTTER GRINDER SPINDLES with clearance Angle Swiveling Heads for Angular Adjustment In A Vertical Plane

EXHIBIT G



POPE INTERNAL GRINDING SPINDLES

for Bryant, Excello, Heald and Landis Grinders.

EXHIBIT H



POPE SUPER-PRECISION HIGH FREQUENCY HEAVY DUTY GRINDING AND MILLING SPINDLES

for speeds up to 100,000 RPM

No. 107

WRITE FOR COMPLETE SPECIFICATIONS, PRICE AND DELIVERY

Specify

POPE

PRECISION SPINDLES

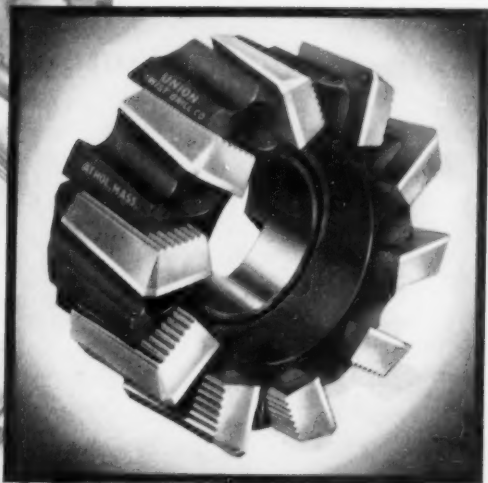
POPE MACHINERY CORPORATION

Established 1920

261 RIVER STREET • HAVERHILL, MASSACHUSETTS

For more data circle 219 on Reader Service Card

**A DIVERSIFIED LINE
OF QUALITY!**



UNION

There's a Union Inserted Blade Cutter ready to do the job for you, quickly, accurately and economically. Union offers a complete selection of top quality Inserted Blade Cutters, standard and special, in two basic designs:

Wedge Type — Taper Serrated Blade Type — to suit the requirements of your job.

Write on your company letterhead for our Inserted Blade Cutter Catalog. Address Dept. D-4.



Call your
Union Distributor
For
Prompt, Dependable
Service

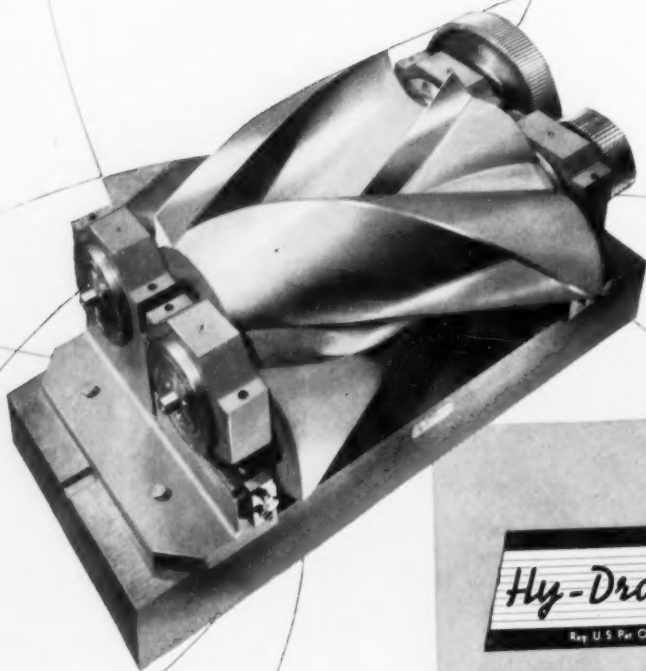
UNION TWIST DRILL COMPANY
ATHOL, MASSACHUSETTS

Owners and Operators of: S. W. CARD MANUFACTURING CO. DIVISION, Mansfield, Mass.,
BUTTERFIELD DIVISION, Derby Line, Vermont and Rock Island, Quebec

For more data circle 220 on Reader Service Card



extremely difficult job ???



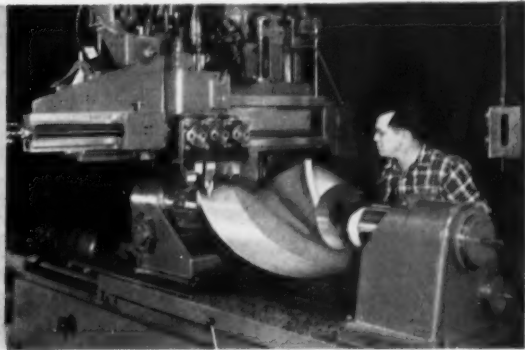
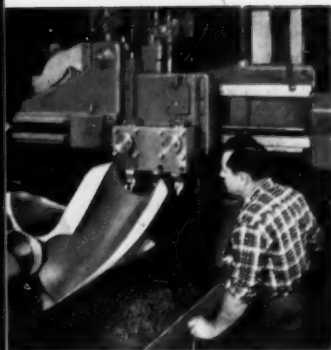
...not for a **hydraulic**
planer and duplicator

Here's another complex machining job solved by using a Hydraulic Kopy-Kat, with a rotor generating Hydraulic Shaper-Planer.

The part is a blower and consists of two sections — a two lobe rotor and a four lobe gate. The helix angle of the rotor is approximately 32 degrees.

Hydraulic Drive is a natural for extremely difficult shaping, planing, slotting and duplicating. It produces accurate work with substantial savings in production time — often several hundred percent over other methods.

Ask a Rockford Machine Tool Co. representative for the latest facts on modern Hydraulic Shapers, Planers, Slotters, Shaper-Planers and Kopy-Kats.



ROCKFORD MACHINE TOOL CO.

2500 KISHWAUKEE STREET • ROCKFORD, ILLINOIS

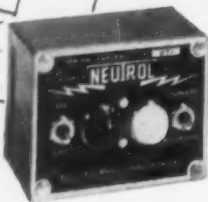
For more data circle 222 on Reader Service Card

electrical controls for

Full Magnetic Chuck performance



(A)
ELIMINATE
STRONG ARM
METHODS



(B)
DEPENDABLE SOURCE
OF DIRECT CURRENT



(C)
PARALLEL
GRINDING
WITHOUT
SHIMMING



(A) **ELECTRO-MAGNETIC
CHUCK CONTROL**

Releases and demagnetizes work pieces simultaneously. No time lost. No damage to work or chuck face. Protects chuck from voltage surges. Speeds production. Chuck capacities: 50 to 15,000 Watts . . . 60 to 20,000 square inch chuck area.

(B) **ELECTRO-MATIC RECTIFIER**

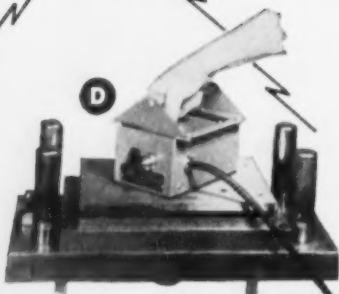
Power conversion Unit, proved for dependable use with Magnetic chucks and other direct current equipment, from 50 Watts to 40 Kilowatts.

(C) **NEUTROLATOR HOLDING POWER
REGULATOR AND CHUCK CONTROL**

Provides regulation of holding power which permits grinding without shimming, to closer parallelism than ever before possible. In production grinding where holding power must be the same with each work piece, Neutrolator reproduces the same tension on successive pieces without readjustment. Where various tensions are required, a simple dial or push-button control provides regulation of holding power.

(D) **ELECTRO-MATIC A.C. DEMAGNETIZER**

Demagnetizes dies, punches, cutters, tools that have been magnetized from any source. Works by simple contact. Operates on standard A.C. voltage. Will not overheat through constant use. A size for every purpose.



*The Best Is None Too Good For
Your Cutting Tools And Dies*

**ELECTRO-MATIC
PRODUCTS
CO.**

2233 N. Knox Ave.

Chicago 39, Ill. (U. S. A.)

Telephone: BEImont 5-4010

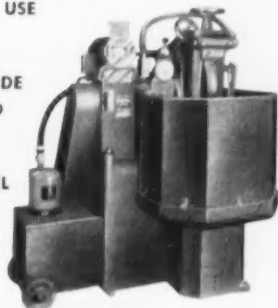
ELIMINATE

Costly "Guess Work"

WITH THE

Oliver **TEMPLATE** TOOL BIT GRINDER

- POSITIVE DUPLICATION ASSURED BY USE OF A MASTER TEMPLATE.
- GRINDING ON SINGLE POINT CARBIDE TOOLS REQUIRES SECONDS INSTEAD OF MANY MINUTES.
- 20" NOTCHED SILICON CARBIDE WHEEL ELIMINATES DIAMOND FINISHING OPERATION IN MOST INSTANCES.
- MACHINE IS EQUIPPED TO PROVIDE WATER BOTH THROUGH THE WHEEL AND ON THE WHEEL FOR CARBIDE GRINDING.
- CAPACITY: TOOL BITS UP TO 1½" WIDE x 1¼" HIGH.
- SPECIAL SHAPES AND SIZES MAY BE HANDLED IN SPECIAL HOLDERS.



Write for Brochure . . . Complete Information.

Oliver **INSTRUMENT • • COMPANY**

1430 EAST MAUMEE



ADRIAN, MICHIGAN

FACE MILL GRINDERS • AUTOMATIC DRILL GRINDERS • DIE MAKING MACHINES
TOOL & CUTTER GRINDERS • DRILL POINT THINNERS • TEMPLATE TOOL GRINDERS

For more data circle 224 on Reader Service Card

Efficiency in Cutting-off is Important

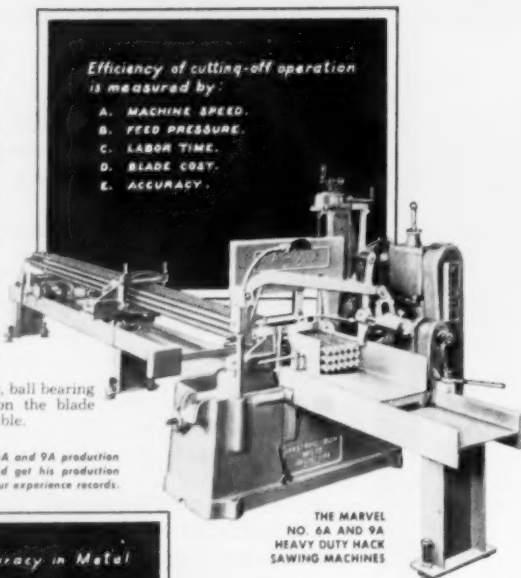
Practically all machining operations start with pieces cut-off from bars or billets. Hence, inefficiency, or lack of capacity, in the cut-off department can hold up or stagnate the entire plant.

- A. Are all-ball-bearing and provide a quick return; therefore they run **FASTER** than others on the same work.
- B. Can apply as much as 1200 pounds feed pressure—two to ten times as much as other hack saws and band saws.
- C. Are fully automatic, requiring no more operator attention than an automatic screw machine; and set-up for any bar size and cut-off length is extremely simple.
- D. Use a non-breakable high speed hack-saw blade—the type of saw blade that produces the greatest number of square inches of metal cut per dollar of blade cost—two to ten times (or more) as much as any band saw.
- E. Because of their exceptional sturdiness, ball bearing reciprocating frame, ability to tension the blade "truly taut", their accuracy is dependable.

If you are not using modern, improved MARVEL NO. 6A and 9A production hack saws, call the local MARVEL Field Engineer and get his production and cost estimates on your work—to compare with your experience records.

Efficiency of cutting-off operation is measured by:

- A. MACHINE SPEED.
- B. FEED PRESSURE.
- C. LABOR TIME.
- D. BLADE COST.
- E. ACCURACY.



THE MARVEL NO. 6A AND 9A HEAVY DUTY HACK SAWING MACHINES

Formula for Accuracy in Metal Sawing:

$$ACCURACY = \frac{\text{Length} \times \text{Straightness} \times \text{Squareness}}{\text{Blade Rigidity} \times \text{Blade Tautness}}$$



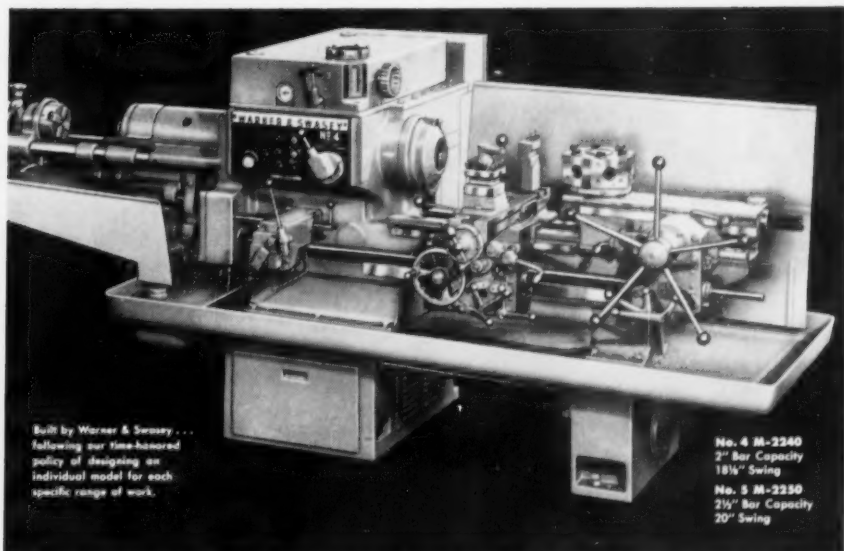
Write for catalog C-55—showing and describing eleven different series of Metal-Cutting Sawing Machines and MARVEL High-Speed-Edge Hack Saw Blades and Hole Saws.

The composite MARVEL High-Speed-Edge Hack Saw Blade—cuts any machinable material efficiently. There is no time lost changing blades for different types of steel; no time lost replacing shattered blades, because MARVEL High-Speed-Edge Hack Saw Blades are positively **unbreakable**. These superior blades have the finest high speed steel cutting edge welded to a strong alloy steel body. They will stand-up under the highest speeds and heaviest feeds attainable on any make hack saw. Can be safely tensioned tauter than any other blade—cut-off not only straight but also square and with less stock loss.



ARMSTRONG-BLUM MFG. CO. 5700 West Bloomingdale Avenue • Chicago 39, U.S.A.

For more data circle 225 on Reader Service Card



Built by Warner & Swasey...
following our time-honored
policy of designing an
individual model for each
specific range of work.

No. 4 M-2240
2" Bar Capacity
18 1/2" Swing

No. 5 M-2250
2 1/2" Bar Capacity
20" Swing

NEW WARNER & SWASEY NO. 4 AND NO. 5 RAM TYPE TURRET LATHES

- Higher Speeds
- Instantaneous speed changes—sliding gears eliminated
- Direct-acting hydraulic clutches—need no adjustment
- Smooth, quiet running, helical high-speed gears
- Single lever control for forward, reverse, brake and free spindle
- One lever control for speed changes and 6:1 ratio high-low shift
- Two-speed motor provides 24 *unduplicated* speeds, forward and reverse, with a 62.5 to 1 over-all range
- Patented direct-reading speed pre-selector—calibrated in rpm's, surface speed and work diameter
- Rigid, heavy-duty, high speed hydraulic bar feed with adjustable feed-out
- Single lever control for hydraulic collet chuck and bar feed
- Zoned operating controls for effortless machine operation
- Retains Warner & Swasey standard tooling interchangeable with your present models

**WARNER
&
SWASEY**

Cleveland

PRECISION
MACHINERY
SINCE 1880

YOU CAN PRODUCE IT BETTER, FASTER, FOR LESS . . . WITH A WARNER & SWASEY

For more data circle 226 on Reader Service Card

January, 1956

modern machine shop 27



USE OUR SKILLS on YOUR LAPPING PROBLEMS



If

*that tough production part has Gage Characteristics,
try the Van Keuren Precision Lapping Service--*

The Van Keuren Co. laps optical flats to an accuracy of .000001", gage blocks to .000004", plug gages to .000010". Your job may not be this precise, but it's a safe bet that VK skills can save you money on lapping problems involving size, flatness, parallelism or fine surface finish. If that tough production part has at least one gage characteristic, ask for a quotation from VK.

We lap flat and cylindrical work in both metals and non-metals. Sealing rings and plates for pumps and

pressure devices, precision pins, spacers, pistons, punches, carbide pivots, valve parts, instrument components and parts for testing or inspection equipment, are among the customer items handled economically here in our plant.

If you require lapped or polished surface finishes in the order of .5 to 5.0 RMS, or dimensional tolerances from .000001" to .0001", The Van Keuren Co. can probably help on the problem. The "rule of thumb," as suggested above, is "at least one gage characteristic."



Send for a copy of the new, 258-page Van Keuren Catalog and Handbook No. 36 containing valuable technical and engineering information on measuring problems and methods. Address:



37th YEAR

THE *Van Keuren* co.,

175 WALTHAM STREET, WATERTOWN, MASS.

Optical Flats . . . Light Wave Equipment . . . Light Wave Micrometers . . .
Gage Blocks . . . Wire Type, Taperlock and Trilock Plug Gages . . . Master
Setting Disks . . . Thread Measuring Wires . . . Gear Measuring Wires . . . Carbide
Plug Gages . . . Laps and Surface Plates . . . Precision Lapping Service.

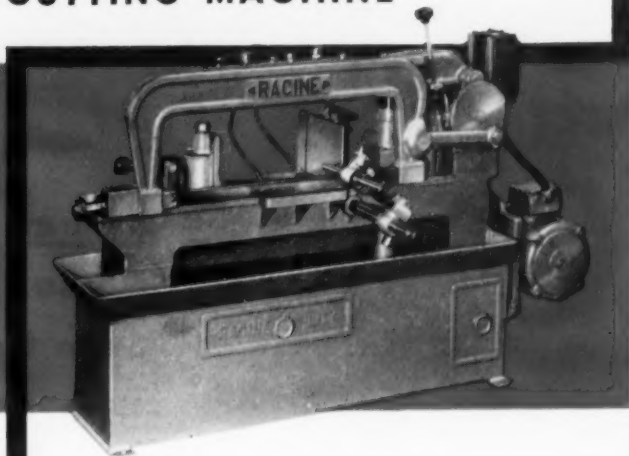


For more data circle 227 on Reader Service Card

New RACINE

8" x 16" UTILITY METAL CUTTING MACHINE

Large
Capacity
Low
Cost



- Adjustable Hydraulic Feed and Control
- Adjustable Stock Gauge
- Adjustable Height Gauge
- Large Coolant System
- No Levers, Springs or Clutches
- Fast, Accurate Economical Operation



The Model 816 combines the important features of wide utility and large capacity. It will handle the full range of general cut-off work from tough tool and dies to mild bars, tubing, and structural shapes up to 8" x 16". A limit switch makes it possible to employ an efficient drive, eliminating the need of a clutch. At the completion of each cut the motor is stopped and the saw frame automatically rises to the highest point. Write us about your metalcutting needs and complete Racine Saw Catalog. Address **RACINE HYDRAULICS and MACHINERY, INC.**, 2070 Albert Street, Racine, Wis.

For more data circle 228 on Reader Service Card

January, 1956

modern machine shop 29

6-DAV/10 Columns, Positive Cost 2, 3, 4, 5, 6, 7, 8, 9, 10

OA

9" column 3'-4' arms

1A

9"-11" column 3'-4'-5' arms

3A

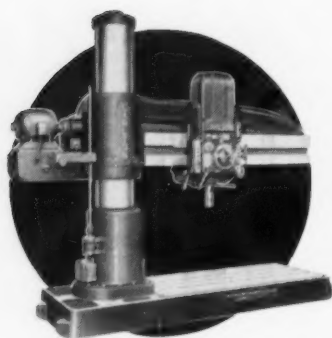
13"-15"-17" column 4'-5'-6'-7' arms

4A

19" column 6'-7'-8' arms

5A

22"-26" column 7' to 12' arms



**Only one
can be called
the finest**

*Only Carlton offers you a choice
of three speed-feed controls:*

Programming for pre-selecting speeds and feeds for an entire drilling program including as many as 20 or 30 operations. Pre-selector for setting speed and feed for the next operation while machine is still under cut. Manual to take advantage of Carlton's centralized push button control. For further information, send today for free descriptive bulletin. The Carlton Machine Tool Co., Cincinnati 25, Ohio.

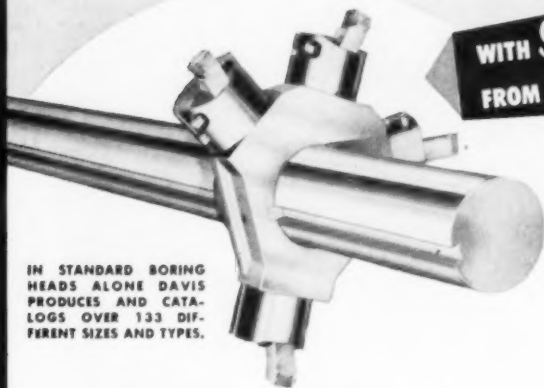
Carlton

horizontal and radial drills

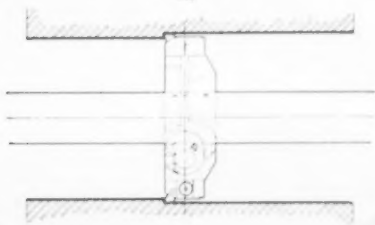
For more data circle 229 on Reader Service Card

Let DAVIS cut your Boring Costs 2 ways

**WITH Standard Tooling ITEMS
FROM INDUSTRY'S MOST COMPLETE LINE**



IN STANDARD BORING HEADS ALONE DAVIS PRODUCES AND CATALOGS OVER 133 DIFFERENT SIZES AND TYPES.



Every boring job in your shop...regardless of range, material or complexity...can be done faster, cheaper and with greater precision, when you make Davis your tooling headquarters. That's because only Davis has both the complete line and broad machining experience to supply or design exactly the right tool for your work.

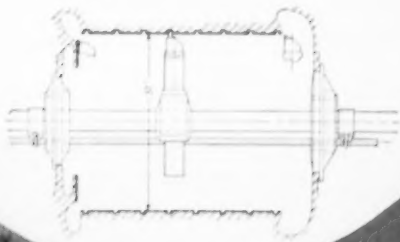
Davis tooling specialists help you immeasurably in selecting the right tool from industry's broadest standard line. Their unrivalled background of practical shop experience assures recommendations that exactly meet all your requirements for tolerances, finish, speeds, feeds and maximum tool life at minimum cost.

**WITH Job-Engineered SPECIALS
FROM INDUSTRY'S FOREMOST DESIGNERS**

Where work is beyond the scope of standard tools or where efficiency can be improved or costs reduced by combined operations, special fixturing, etc., the specialists in Davis Engineered Tooling Service will work with you in developing tools for even the most complex application. Consult your local Davis field engineer or send us complete work details for impartial recommendations.



TYPICAL OF DAVIS SPECIAL TOOL DESIGNS IS THIS EXTENSION BORING HEAD WHICH BORES, FACES AND GROOVES A 31" DIAMETER HOLE.

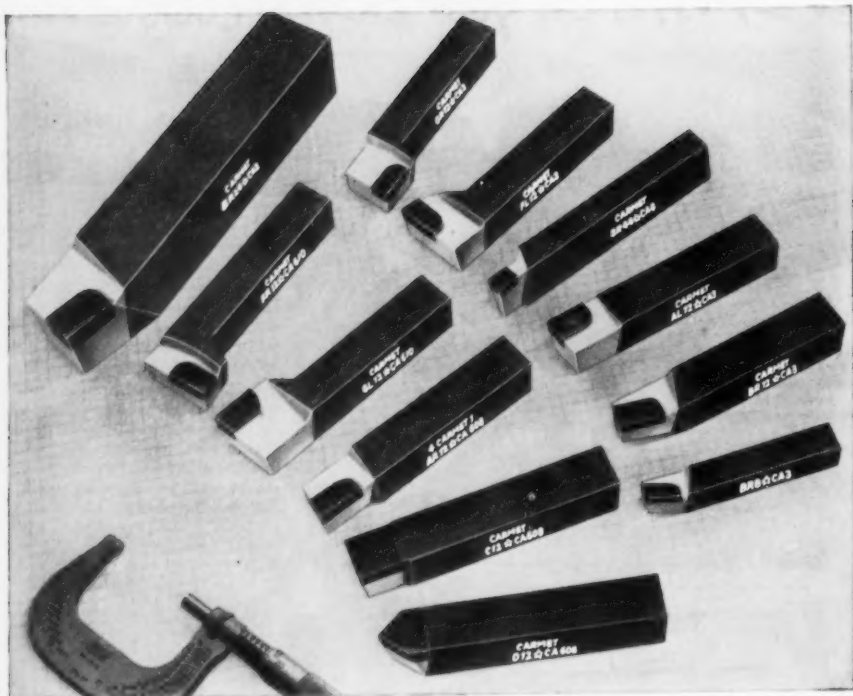


DAVIS

BORING TOOL DIVISION

an Alameda & Lewis Machine Tool Company
Fond du Lac, Wisconsin

THE ONE NAME THAT CERTIFIES ULTIMATE PRECISION AND PRODUCTIVITY IN TOOLING



Handle any Cutting Job • • • Cut your Cutting Costs—with

CARMET®

WHAT OTHER JOBS HAVE YOU FOR CARMET TO DO?

We specialize in precision performing of Carmet carbide metals to any shape for special wear-resistance needs, such as dies, gage blanks, etc. Let us quote on your requirements.

WRITE FOR YOUR COPIES OF THESE HELPFUL BOOKLETS



CARMET CATALOG

36 pages, grades, tool styles, sizes, etc.

METHODS MANUAL

20 pages on speeds, feeds, cuts, etc.



ADDRESS DEPT. MS-73

The Allegheny Ludlum line of Carmet Carbide Tools is *complete*—every style, size and grade you may need for any cutting job in the shop. If you make your own tools, a full line of blanks is available, too—as well as all necessary grades of AL Tool Steels for back-up materials. Extensive stocks of Carmet standard tools and blanks are carried in Distributors' warehouses coast to coast, and special tools are available to order. • Just remember, for best performance on any application, use Carmet! Allegheny Ludlum Steel Corporation, Carmet Division, Wanda and Jarvis Aves., Detroit 20, Michigan.

For **ALL** your CARBIDE needs, call
Allegheny Ludlum



For more data circle 231 on Reader Service Card

↓ Use this Reader Service Card for requesting more information on products described and advertised ↓

READER SERVICE CARD

January 1956 Issue

GOOD UNTIL MARCH 1, 1956

Your Name _____ Your Title _____

Company Name _____

Company Address _____

City _____ Zone _____ State _____

Products Manufactured _____

Number of Plant Employees _____

Circle KEY numbers (NOT PAGE NUMBERS) for more information on items described or advertised in this issue.

431 Main Street
Cincinnati 2, Ohio

modern
machine
shop

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489	508	527	546	565
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491	510	529	548	567
492	511	530	549	568
493	512	531	550	569
494	513	532	551	570
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498	517	536	555	574
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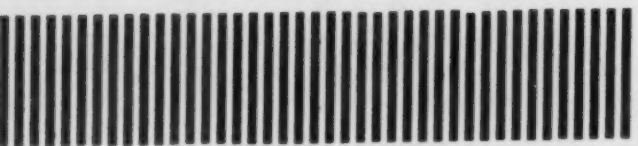
**modern
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shop**

BOX 74

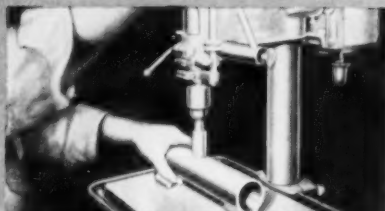
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NEW YORK, N. Y.



Starrett announces NEW SAFE-FLEX® high speed-welded edge HOLE SAWS



A typical application—cutting hole in pipe.



Illustration shows 2" hole saw and A2 arbor with 1/2" hexagon shank.

DOUBLE-WELDED

Shatterproof, double-welded construction — identical with the same advanced design used in Starrett SAFE-FLEX Hacksaws — makes these hole saws the safest, fastest-cutting, most durable hole saws you've ever sold. They're double welded to combine an extra tough, shatterproof body with a high speed steel cutting edge — a combination that is practically unbreakable and defies tooth stripping.

Available in a wide range of sizes from 1/8" through 4 1/2" diameter to cut clean round holes in any machinable material including steel, brass, bronze, cast iron, aluminum, wood, plastics or sheet metal, as well as cast iron or steel pipe. Can be used with portable power tools, lathes, drill presses, radial drills, etc.

WRITE FOR CATALOG

These new Starrett Hole Saws are an important addition to the complete line of Starrett Hacksaws, Band Saws and Band Knives. The complete line is described in new Catalog No. 1053. Write for free copy. Address Dept. MD.



Showing hole saw removed from arbor.

INTERCHANGEABLE ARBORS

A wide range of saws fit four interchangeable arbors which include a 1/4" high speed pilot drill. Arbors are available with 1/2" and 3/4" hexagon shanks and also a 1/4" round shank. Arbor screws into the saw cap and is locked by two drive pins which provide a positive, flexible drive. A 12" long extension is available for arbors with 1/2" hexagon shank.

BUY THROUGH YOUR DISTRIBUTOR



Starrett®

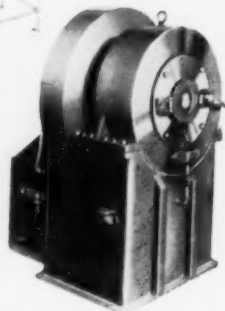
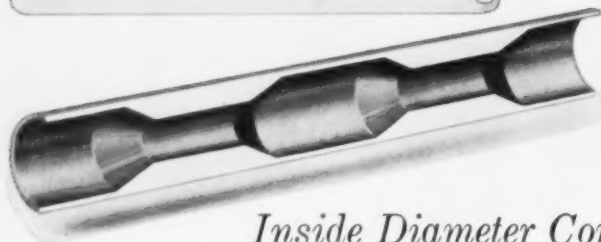
"WORLD'S GREATEST TOOLMAKERS"



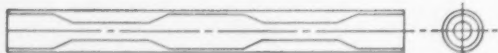
MECHANICS' HAND MEASURING
TOOLS AND PRECISION INSTRUMENTS • DIAL INDICATORS • STEEL TAPES
PRECISION GROUND FLAT STOCK • HACKSAWS, BAND SAWS and BAND KNIVES
THE L. S. STARRETT COMPANY, ATHOL, MASSACHUSETTS, U. S. A.

For more data circle 232 on Reader Service Card

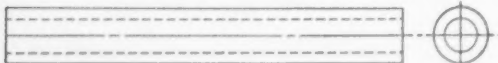
Swaging Success Stories



Inside Diameter Contours ... Easily Produced by Swaging



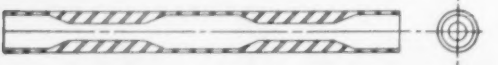
Machining multiple-diameter contours on the inside of cylindrical pieces (Fig. 1) is a difficult, time-consuming job.



Torrington's Swager experts start with tube of larger OD (Fig. 2) and machine the blanks to predetermined outside shape (Fig. 3).



Simply by swaging the outside to a straight, uniform diameter, the intricate contours are transferred to the inside (Fig. 4). Result: a sizeable saving in machining costs.



Swaging Advantages...

No Chips... No Waste... No Scrap

Swaging reduces metal—saves material—does not cut it away wastefully.

Swaging work hardens metal—gives it added strength, better finish and resiliency, dimensional accuracy.

Swaging is fast—can be done by unskilled workers to produce more pieces at lower cost.

Write for our informative booklet on Swaging that gives detailed descriptions of Torrington Rotary Swagers. It may show you how to achieve new savings in your own plant.



THE TORRINGTON COMPANY

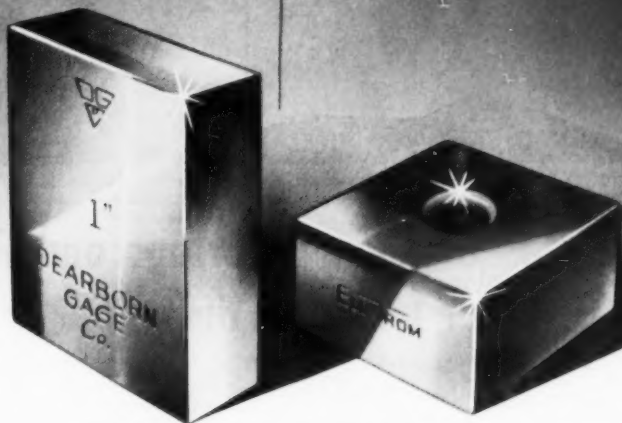
Swager Department
730 North Street, Torrington, Conn.
Makers of Torrington Needle Bearings

TORRINGTON *ROTARY SWAGING* **MACHINES**

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Ellstrom

measuring in millionths for three generations



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WE'RE "fussy" about the gage blocks we make. And we hope, when you buy a set, that you'll be fussy, too. Because only by your own critical, impartial inspection of each individual block can you come to appreciate the full measure of quality inherent in Ellstrom Standards.

Yes, we'd like you to check any set of Ellstrom Gage Blocks. Check them block-by-block for size . . . for their consistent adherence to closer than specified accuracy. For flatness . . . parallelism . . . and the finish of their hard chromium plated gaging surfaces that give you greater serviceability, longer wearing millionths. And test them, too, for coefficient of expansion and controlled metallurgical stability. Then you'll know why it pays to standardize on Ellstrom Standards!

If You Buy Gage Blocks, send for your copy of this new Ellstrom Standards Catalog. Contains complete specifications and prices on the entire line. Write for it today!



ELLSTROM STANDARDS DIVISION
Dearborn Gage Company • 22035 Beech Street • Dearborn, Michigan
Originators of Chromium Plated Gage Blocks

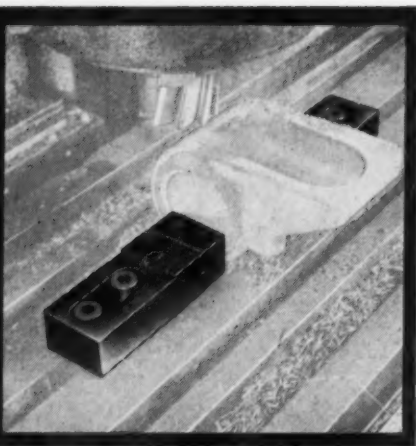
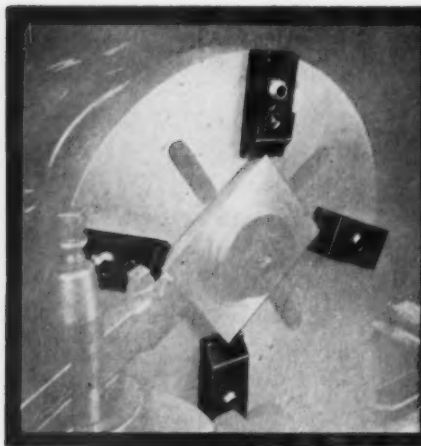


REPRESENTATIVES IN PRINCIPAL CITIES THROUGHOUT THE UNITED STATES AND CANADA

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January, 1956

modern machine shop 35



J & S "ALL-PURPOSE" JAW CLAMPS CAN BE USED ON ALL STANDARD TYPES OF MILLING MACHINES (LATHES, PLANERS, BORING MILLERS, DRILL PRESSES, AND OTHER MACHINE TOOLS)

Eliminate "U" Clamps, Straps and Fingers, cut handling time 75%

J & S "All Purpose" Jaw Clamps give you many unusual advantages in securing workpieces to machine tools—save as much as 75% of the time required with outdated methods.

Downholding Principle

J & S' *downholding* principle makes this possible. Here's how it works: When you turn the adjusting screw of the clamp, the jaw travels straight *in* and *down*. This forces the workpiece horizontally against the opposite clamp and downward against the face plate or table. In this way, centering is quick, simple. The tapered slot prevents the clamp from slipping regardless of the load.

Need no U-clamps or straps

With J & S "All Purpose" Jaw Clamps, you can avoid the use of U-clamps and straps, disregard different length studs and blocking. You can also minimize obstructions in set-ups, reduce cut-off waste. You can pass over J & S Jaw Clamps 1" from the working surface of the machine face. The whole surface of the workpiece can be machined to within $\frac{1}{16}$ " of the face plate or table.

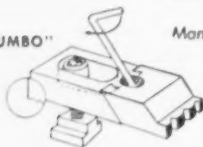
You can get J & S "All-Purpose" Jaw Clamps in a variety of sizes. Write for complete information today.

J & S "JUMBO" and "LI'L GIANT" JAW CLAMPS

For large planers

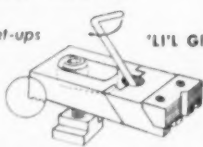
Many times more powerful than finger set-ups

"JUMBO"



COMPLETELY HARDENED

"LI'L GIANT"



Both clamps have T-nuts which fit all large standard planers. 45° oblique travel of jaw secures workpiece against table and against counterthrust of opposite clamp. $\frac{1}{16}$ " back taper (dotted line) and relieved ground surface (magnified detail) prevent slippage



WHEEL DRESSERS • JAW CLAMPS • PRECISION VISES • SINE BARS • DOWN-HOLDING DEVICES

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***GUARANTEED 2000 HOURS OR 1 YEAR**

SIMPLE DESIGN:

Only six parts. One-piece main body serves as cup for roller bearing on which spindle turns. Allows much greater capacity bearing in same size body.

AUTOMATICALLY ADJUSTS FOR WEAR:

End thrust from work keeps tapered roller bearing perfectly seated—bearing cone and inner race of ball bearing are pressed on spindle; outer race is a light press fit into main body.

ABSOLUTE CONCENTRICITY AND ALIGNMENT FOR BEARINGS:

Both conical and cylindrical bores of body are ground at same setting in work head. Point is ground under load in its own bearings to insure running dead true.

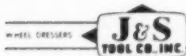
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J & S TOOL CO., INC.

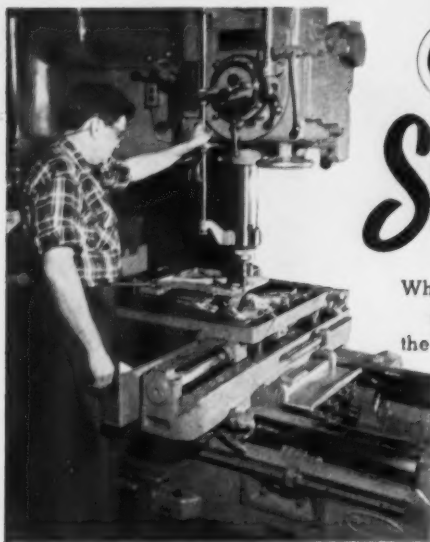
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ACCURATE LOCATING PERFORMANCE

Acclaimed By Customer with . . .



BULLARD

Spacer Table

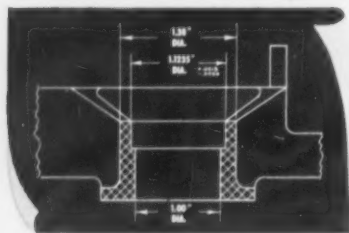
Where close tolerances must be maintained on repetitive pieces the Bullard Spacer Table is a "natural"

"The machine is simple to operate.

We have found the Bullard Spacer Table very useful in our work", says a foreman at San Diego Division of Convair, "It eliminates the necessity of zeroing to a set position. And there is no chance for error, which is important when you make accurate parts for airplanes."

This same accuracy to close tolerances can be applied to your drilling, reaming or tapping operations without the high cost of jigs or fixtures.

Identical machining operations on each of three holes for battery carriage are performed on the Bullard Spacer Table.



OPERATION DATA

OPERATION	SET UP TIME	UNIT TIME
Drill 1 dia.	.70	.2066
Counterbore 1.1235" dia., at 1.000 dia. .350" deep	.25	.0566
Face 1.38" dia.	.25	.0356

CALL YOUR NEAREST BULLARD REPRESENTATIVE
OR WRITE FOR SPACER TABLE CATALOG TO

THE

BULLARD

COMPANY

BRIDGEPORT 2, CONNECTICUT

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at the BEST Price**

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Only low cost mill head with quill travel attachment.
High speed medium-light operation.
For bench, floor and pedestal mills.
Fits milling machines with overarm 1 1/2" to 3".
3/8" end mill capacity.

\$245.00



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1/2 H. P. MILL HEAD

HEAVY DUTY MILLING ATTACHMENT
Fits milling machines with 3" to 5" overarm.
3/4" end mill capacity.
For vertical, horizontal and angular operations.

1 H. P. MILL HEAD

HEAVY DUTY MILLING ATTACHMENT
Fits milling machines with 3" to 5" overarm.
3/4" end mill capacity.
For vertical, horizontal and angular operations.

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1850 lb. DRILL BIT PRESSURE FROM A PORTABLE DRILL PRESS

Here
is the
drill press
that will go almost
any place, hold fast to any
steel surface **ONE INCH** wide across
the face of magnet or larger—and make
a precision tool of **any** standard portable drill.

BECAUSE:



1. Bux L-3 concentrates its tremendous magnetic power in a base barely 6" in diameter.
2. Bux L-3 rack and pinion drive eliminates alignment variation during full 12" stroke.
3. Bux L-3 adapters will accommodate ANY standard portable drill, and will operate on 120 AC or DC current.
4. Bux L-3 weighs only 46 lbs.

There is a way—perhaps many ways, BUX magnetic drill presses can work **SAVINGS** in your plant. Your Bux dealer can show you how. Write for fully descriptive literature and the name of your dealer . . . today. Write to Buck Mfg. Co., 103 Roberts Road, Los Gatos 2, California.

BUX L-3 Portable Magnetic drill press Price \$350.00

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Which BUSHING SHOULD YOU USE?

Your choice is getting broader every day. Each of the guide pin bushings above is good—in the right application. But, some of them cost more than others. Which should you use for best results consistent with cost?

That's where Detroit Die Set can help you. In our 25 years of exclusively building die sets, we've tested a good many types of bushings. Based upon these tests and performance in our customers' plants, we stock and recommend a number of types of bushings for use in our die sets.

To aid you in bushing selection, we've prepared a bulletin on the subject. Just ask for Bulletin 56, and we'll send your personal copy without delay. Detroit Die Set representatives also will be glad to personally aid you in selecting the right bushings and die sets. They're as near as your 'phone.

*Offices
in Principal
Industrial Centers*

Detroit
DIE SET
CORPORATION

**2895 WEST GRAND BLVD.
DETROIT 2, MICHIGAN**

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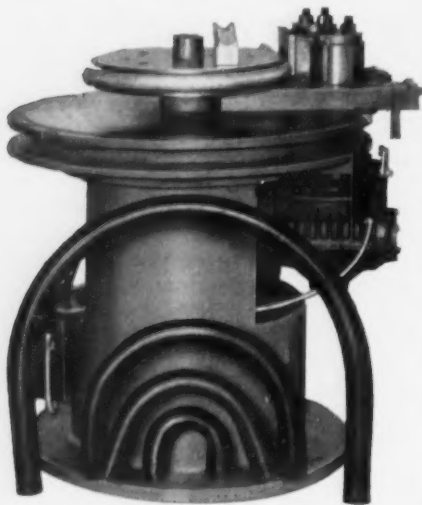
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Pedrick Production Benders offer new standards of efficiency and economy for all pipe, tube and structural bending. Even the most difficult bends can now be made on a production or jobbing basis.

Let us know your problem — and supply a cost-cutting solution.

Write PEDRICK TOOL & MACHINE Co.,
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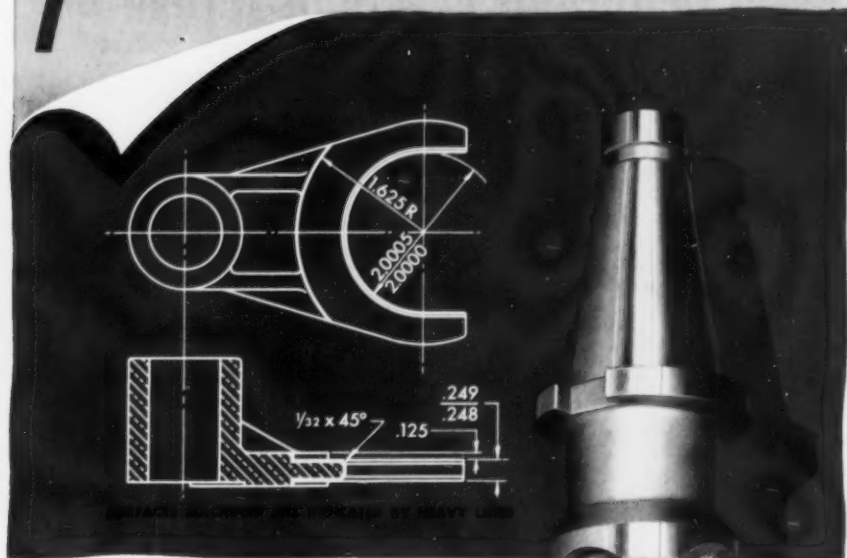
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production benders

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7 SURFACES on SHIFTER FORK MACHINED AT 1 PASS!

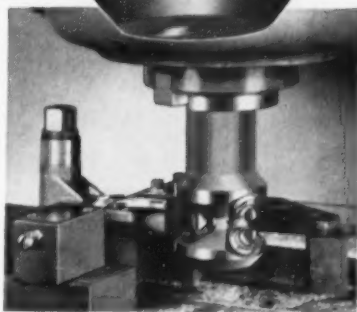


And held to precise limits by using MICROBORE® Precision Tooling-

Illustration shows setup for completely machining shifter forks on standard Vertical Milling Machine to precise limits of accuracy on a production basis.

This application of Microbore Cluster Tooling permits use of simple low-cost work holding fixture, and substantially reduces tool costs per piece.

Write for Illustrated Catalog...



Microbore®
PRECISION TOOLING

DEVILIEG MICROBORE CO.

2720 West Fourteen Mile Rd. • Royal Oak, Michigan

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January, 1956

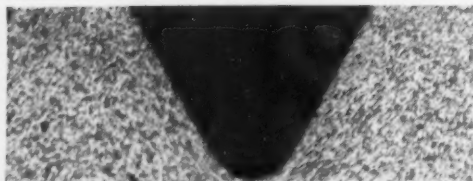
modern machine shop 43

Up to 40% higher tightening torques — a feature of new High-Torque Unbrako socket set screws

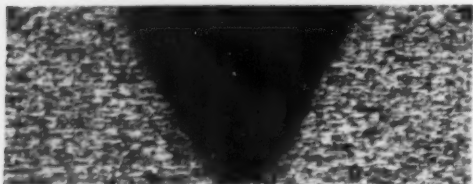
RECOMMENDED SOCKET SET SCREW TIGHTENING TORQUES (Inch-Pounds)				
SCREW SIZE	UNBRAKO	SET SCREW B	SET SCREW C	MINIMUM DIFFERENTIAL %
#4	5	3.9	3.5	28
#5	9	7.8	7.4	15
#6	9	7.8	7.4	15
#8	20	14.7	14.5	36
#10	33	26.5	25	25
1/4	87	62	60	40
5/16	165	122	125	32
3/8	290	198	225	29
7/16	430	309	350	23
1/2	620	460	500	24
5/8	1225	1106	1060	11
3/4	2125	1540	1800	18
7/8	5000	3660	4600	9
1	7000	5025	6500	8

Compare UNBRAKO-recommended tightening torques with those of ordinary socket set screws and you readily see why you can set an UNBRAKO and then forget it. The reasons are simple. UNBRAKOS have deeper sockets, which give you better purchase with the wrench; rounded socket corners, which eliminate the sharp corners where cracks start; fully formed threads, which make them stronger; and knurled cup points, which keep them tight.

Let's see just how the development of fully formed threads make the new High-Torque UNBRAKO stronger. The metal is compressed into the closely knit grain structure that you see in the illustration. The grain flow follows the contour of the threads. There are no straight lines along which shear can occur. An UNBRAKO retains its flow lines even when ground down to .010" below root diameter. Conversely, cut or ground threads have straight flow lines—lose thread form at root diameter.



UNBRAKO SET SCREW THREADS



ORDINARY SET SCREW THREADS

You can't buy a better screw than an UNBRAKO. And you can't get full *high-torque* performance without a "High-Titan" UNBRAKO Hex Key—the high-ductility, precision internal wrenching tool. See your authorized distributor today. Or write STANDARD PRESSED STEEL CO., Jenkintown 22, Pa.

UNBRAKO SOCKET SCREW DIVISION

STANDARD PRESSED STEEL CO.

SPS

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SANFORD

SURFACE GRINDER

MODEL MG

For Dry or Wet* Grinding!
PRECISION • SPEED • SENSITIVITY

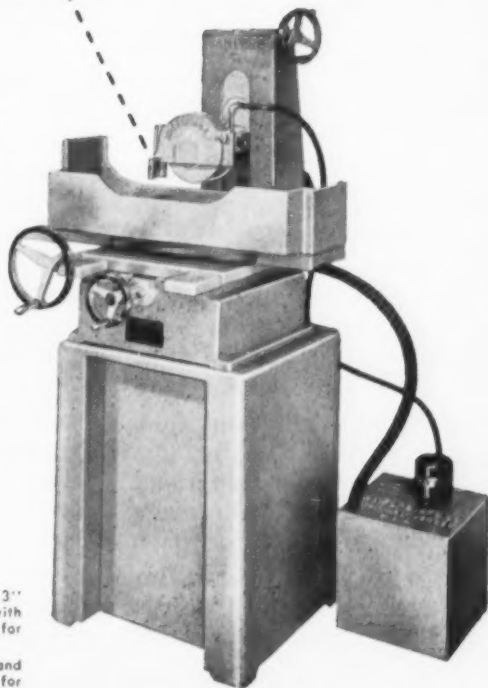
Built by manufacturers who concentrate on small grinders only, each Sanford Grinder is an individual project of time tested and proved basic design. Although modest in price, no quality undermining shortcuts are employed to reduce manufacturing costs. Constant repeat orders prove its acceptance.

This sensitive machine grinds to micro-inch accuracy with no vibration, with maximum dimensional stability. Here's why:

- Transverse ways are double Vee (VV) Meehanite inserts instead of flat surfaces which depend upon unstable jibs for alignment and accuracy.
- Needle, Ball and Oilite Anti-Friction bearings are used throughout.
- Alignments are electronically checked for accuracy.
- Precision slides are ground, lapped and hand spotted.
- Dials are large and legible.

SPECIFICATIONS — 8 $\frac{3}{4}$ " transverse — 13" longitudinal — 12" vertical under 7" wheel with Adapter. Approximate weight 630 lbs. Send for illustrated bulletin.

Replacement parts, special attachments and reconditioning facilities are available. Send for price list.



SANFORD

MANUFACTURING CORP.

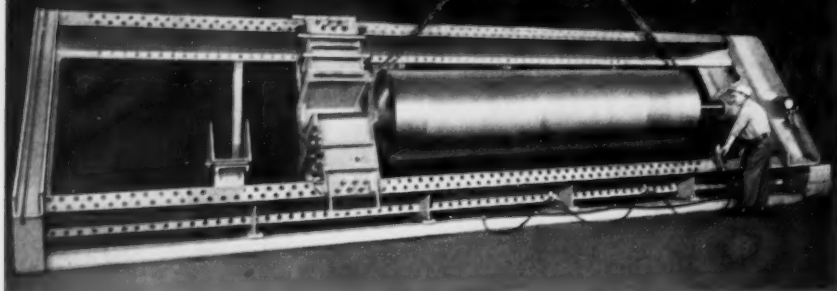
1022 Commerce Ave., Union, N. J.

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January, 1956

modern machine shop 45

When jobs are too big or heavy for a conventional press...



THE DAKE HORIZONTAL INCLINED PRESS is recommended for work on jobs that are so big or heavy that it is more convenient to do press work while they remain suspended from an overhead crane or hoist.

For instance in the illustration above, a 7-inch shaft is being pressed into the cable drum for a 200-ton overhead traveling crane. The drum is 17 feet long and 4 feet in diameter, and is supported on a crane hook.

This particular press (Model 32-100) is 33 feet long overall, and has a daylight opening of 25 feet. It has 300 tons capacity, a 60° inclined frame, 26-inch stroke, and a ram-to-table distance from 25 inches to 25 feet. The table is moved along the frame with a hand winch.

Dake Hydraulic Presses are engineered to meet such a variety of shop requirements that the engineering is probably almost done on the press you need. Let us quote.

DAKE CORPORATION, 612 Seventh St., Grand Haven, Mich.



Arbor
Presses



Hand-Operated
Hydraulic



Power-Operated
Hydraulic



Guided
Platen



Gap Type
Presses



Movable
Frame

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NEW

design freedom

FEATURED IN THE EXPANDED DANLY DIE SET LINE

NOW Danly meets or beats all ASA standards . . .

with the world's broadest die set line. There's no need for compromise between the standard set you want and the set you can get, less need for costly specials. The new line of Danly Standard Die Sets has die space and guide post dimensions that equal, or exceed, ASA specifications. Under the new standards, front to back die space is measured from edge of bushing to front of die set.

In addition to offering a complete selection of ASA standard die sets, Danly provides the Danly Standards proved popular over the years . . . all available from stock at your nearest Danly Branch. You can be sure of meeting all your die set needs at Danly . . . either ASA standard or Danly Standard.

NOW Danly offers you these additional features



Oil Lubrication System For Shoulder Bushing Sets. This new Danly die set feature assures longer life, easier maintenance, proper lubrication even during long runs.



All Horizontal Surfaces Ground On New Danly Die Sets. Horizontal surfaces, including top of punch holder and bottom of die holder, are ground to the same exacting precision as the inner die set surfaces.



Integral Welded Shanks. 100% weld on all steel sets regularly furnished with shanks gives greater strength and rigidity. Deep counterbores in punch holder have less tendency to withdraw set.



DIE SETS AND
DIEMAKERS' SUPPLIES

DANLY MACHINE SPECIALTIES, INC.
2100 South Laramie Avenue, Chicago 50, Illinois.



CUTS A KEYWAY...

Why go to the time and expense of setting up a big machine tool when for as little as one cent and in just one minute you can cut a keyway with a Minute Man Keyway Broach Kit? For keyways from $\frac{1}{16}$ " to 1" in any bore from $\frac{1}{4}$ " to 3".

Minute Man Broaches for square and hexagonal holes and Production Type Keyway Broaches are also available from stock at your Industrial Distributor's.



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MAIL FREE BROACH CATALOG AND PRICE LIST S describing 26 standard kits, 49 standard broach sizes, 59 standard bushing sizes and a wide range of SPECIAL BROACHES to

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Meetings

Important Meeting Dates

★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★

January 9-13 • Society of Automotive Engineers, Inc., Annual Meeting, Sheraton-Cadillac Hotel and Hotel Statler, Detroit. Society headquarters: 29 W. 39th St., New York 18, New York.

January 20 • Malleable Founders' Society, Semi-Annual Meeting, Hotel Cleveland, Cleveland. Society headquarters: 1800 Union Commerce Bldg., Cleveland 15, Ohio.

January 23-24 • Industrial Heating Equipment Association, Annual Meeting, LaSalle Hotel, Chicago. Association headquarters: Associations Bldg., Washington 6, D. C.

January 23-26 • Plant Maintenance and Engineering Show, Convention Hall, Philadelphia. Information: Clapp & Poliak, Inc., 341 Madison Ave., New York 17, New York.

January 24-27 • American Management Association, General Management Conference, Fairmont Hotel, San Francisco. Association headquarters: 330 W. 42nd St., New York 36, New York.

March 19-23 • American Society of Tool Engineers, Annual Meeting and Industrial Exposition, International Amphitheatre, Chicago. Society headquarters: 10700 Puritan Ave., Detroit 38, Michigan.

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KEEPS HIGH SPEED CUTTING

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If you machine the toughest metals at high production rates, particularly with carbide tools, you'll get better results with Lusol. This oil-free, chemical, transparent, metal-working solution has the highest heat-removing quality of any coolant *at the point of cutting*. Lusol's tiny droplets get right to that point, keep tools, work and chips cool. Tools last longer, finish is better, closer tolerances are possible in work pieces because uniform low temperature machining minimizes expansion and contraction. And Lusol is good to work with. It is a combination coolant, cleanser, rust preventive and water conditioner. It is non-irritating to the skin and does not cause odors or smoke. Users from coast to coast depend on Lusol — because it's **BETTER FOR THE WORK AND BETTER TO WORK WITH**. Write for complete information.

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Double-strength Lusol for minimum storage and handling.

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For grinding. Combines cooling and lubrication.

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Kills bacteria.

Lusol Tapcool

A series of threading and tapping compounds.

THE
Lusol

LINE

... BETTER PRODUCTS FOR BETTER METAL WORKING

F. E. ANDERSON OIL CO., INC.

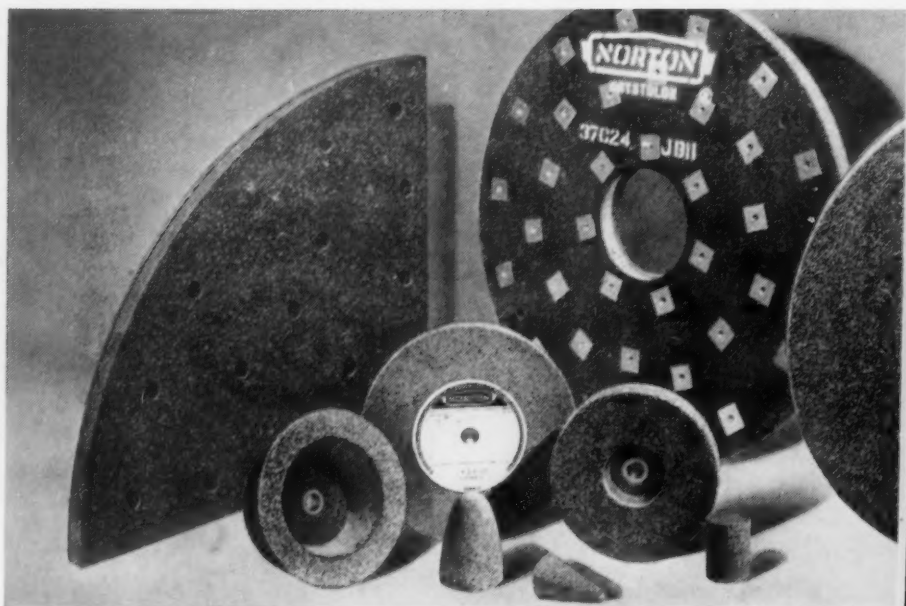
PORTLAND, CONNECTICUT

4A055B

For more data circle 248 on Reader Service Card

January, 1956

modern machine shop 49



Q. What's new in grinding?

**A. B-11 resinoid-bonded wheels
— for many grinding jobs**

Q. What's new about B-11 wheels?

**A. Their great new resinoid bond, improved
uniformity and balance, new "TOUCH of GOLD"
performance-benefits**

Q. What is the B-11 bond?

A. It's the latest Norton resinoid bond. Wheels made with it are excellent for snagging, disc grinding, heavy weld grinding, thread grinding, cam grinding,

centerless grinding, roll and surface grinding.

Q. Why?

A. Because B-11 wheels are more uniform in structure, with better balance.



As a result, they grind cooler and faster. And on portable machines they "hug that work" closer, with less vibration and bounce.

Q. What about those "Touch of Gold" benefits?

A. They're the direct result of the B-11 wheels' more efficient grinding action. In precision grinding this means improved surface finish, greater accuracy, more pieces per dressing. In rough grinding it means less operator-fatigue and longer wheel life. All these benefits add up to more profitable grinding for you.

Q. Any other advantages of B-11 wheels?

A. Many others. For example you get closest possible duplication. Hardness increments are evenly spaced throughout the entire grade scale. And B-11 wheels can be supplied in half-grade increments, making it even easier for you to choose exactly the right wheel for every job.

Q. Sounds fine — what about more information?

A. Your Norton Distributor will gladly give you the whole story on the new B-11 wheels. Or write us direct. NORTON COMPANY, Worcester 6, Mass. Distributors in all industrial areas, listed under "Grinding Wheels" in your phone book, yellow pages. *Export:* Norton Behr - Manning Overseas Incorporated, Worcester 6, Mass.

W-1577



*Making better products...
to make your products better*

NORTON COMPANY: Abrasives • Grinding Wheels • Grinding Machines • Refractories
BEHR-MANNING DIVISION: Coated Abrasives
Sharpening Stones • Pressure-Sensitive Tapes

For more data circle 250 on Reader Service Card

NEW *Grip-Tip* CENTERS

CHECK
THESE

Grip-Tip FEATURES

- Long-Life Holders
- Replaceable Carbide Tips
- Easy Insertion and Removal of Male or Female Tips
- Reduced Machine Down-Time
- Lower Cost for Replacement of Carbide Tips
- Carbide Tips Accurate to .0003"
- No Regrinding of Holder
- Carbide Tips Are Easy and Inexpensive to Stock
- Reduced Regrinding Time
- Longer Diamond Wheel Life



with

REPLACEABLE CARBIDE TIPS

Grip-Tip Centers are specifically designed to substantially reduce your replacement costs and machine down-time for regrinding or replacement of worn or chipped centers.

Male or female carbide tips are inserted or removed from the tool steel holders by simply turning a screw. The unique clamping action of holders on tips is positive and quick . . . you save replacement time with Grip-Tip Centers.

The life of Grip-Tip holders is practically unlimited, for, only the dull or chipped carbide tips are

reground. Because the steel holder is not ground when sharpening the carbide tip there is less clogging and longer life for your diamond wheels. Also, the relatively inexpensive double end tips in both male and female types can be stocked with a minimum investment . . . Grip-Tip Centers reduce tool and inventory costs.

Grip-Tip Centers increase your production by permitting full utilization of machine tools. It takes but a minute to remove old carbide tip and replace with a new one . . . machine down-time is less with Grip-Tip Centers.

For Further Information, Write to:

DETROIT REAMER & TOOL CO

780 W. MAPLE RD. • P.O. BOX 174 • BIRMINGHAM, MICH.



For more data circle 251 on Reader Service Card

modern machine shop

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★ ★ ★

modern machine shop
431 Main St. Cincinnati 2, Ohio

January, 1956

1500° F. IN 5 MINUTES



Quick-Acting
JOHNSON
No. 120 Hi-Speed
FURNACE
\$167.00

F.O.B. Factory

2300° F. IN 30 MINUTES

Turn the heat on production. Heat treat carbon and high speed steels, dies and tools in your own plant with JOHNSON No. 120 Hi-Speed. Fast heat-up saves time and gas. Temperatures easily regulated with accuracy. Firebox: 5 x 7 1/4 x 13 1/2. Complete with Carbofrax Hearth, G. E. Motor and Johnson Blower.

Also available in bench style.
Write for Free Catalog.

Johnson Gas Appliance Co.,

571 E Avenue N.W., Cedar Rapids, Iowa

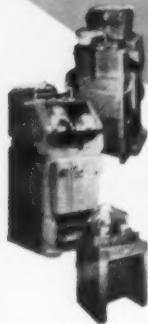
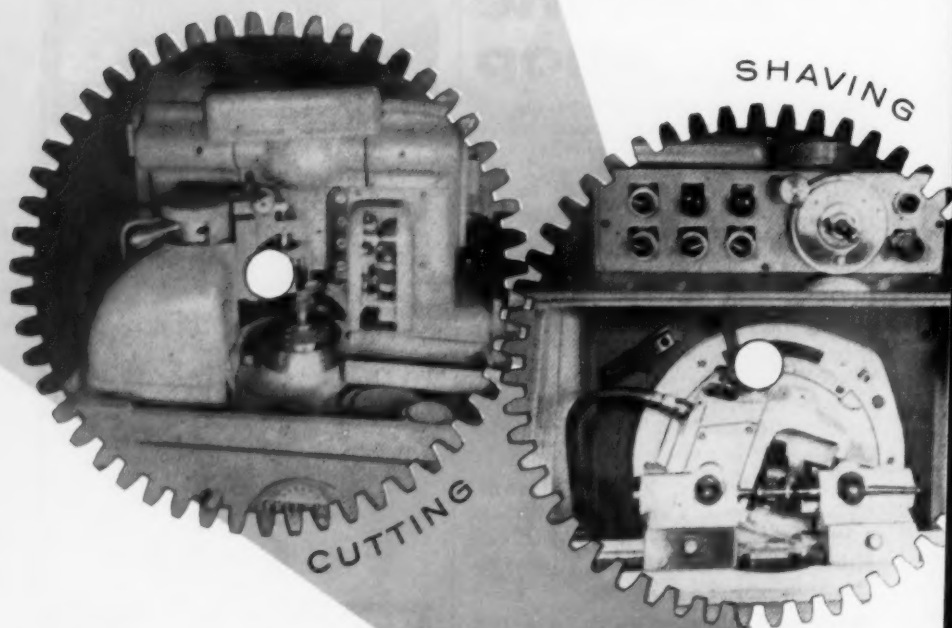
JOHNSON

FURNACES FOR INDUSTRY

For more data circle 252 on Reader Service Card

modern machine shop 53

FULLY INTEGRATED



Fellows 3-Inch Gear Shaper will handle work from $1/16"$ to $3"$ pitch diameter and as fine as 200 pitch on spur gears. It provides for unusually high speeds...automatic deburring, too.

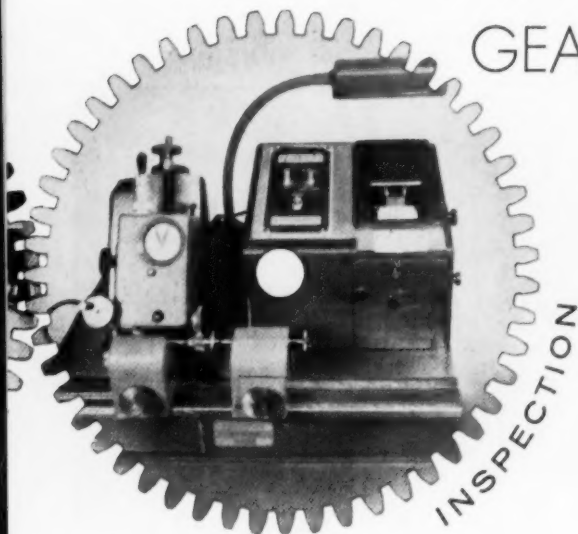
Fellows No. 4 Gear Shaving Machine provides the fastest possible finishing on spur and helical gears from $1/16"$ to $4"$ pitch diameter, $1"$ face width, 20 diametral pitch and finer. The last word in quality.

Fellows No. 4 Red Line is especially adapted to the "composite check" of fine-pitch precision gears. Electrical recorder amplifies errors 200, 400 or 800 to 1 and records them on a paper chart. Very fast!

THE
PRECISION
LINE

PRODUCTION

FOR FINE-PITCH GEARS, TOO



At the NMTB Show, gear men had the opportunity to see for themselves how quantity production of high precision fine-pitch gears can be achieved at low cost. Using a Fellows 3-Inch Gear Shaper, No. 4 Fine-Pitch Gear Shaving Machine and No. 4 Red Liner...all fully integrated...production speeds can be obtained that a short time ago were considered impractical. Simultaneously, close tolerances can be assured which will meet the most exacting gear-train requirements for electronics and instrumentation.

If you are interested in fine-pitch gears...either as a producer or user, or both...it will certainly pay you to get all the facts about Fellows line of fully integrated equipment. WRITE, WIRE or PHONE any Fellows Office today!

THE FELLOWS GEAR SHAPER COMPANY

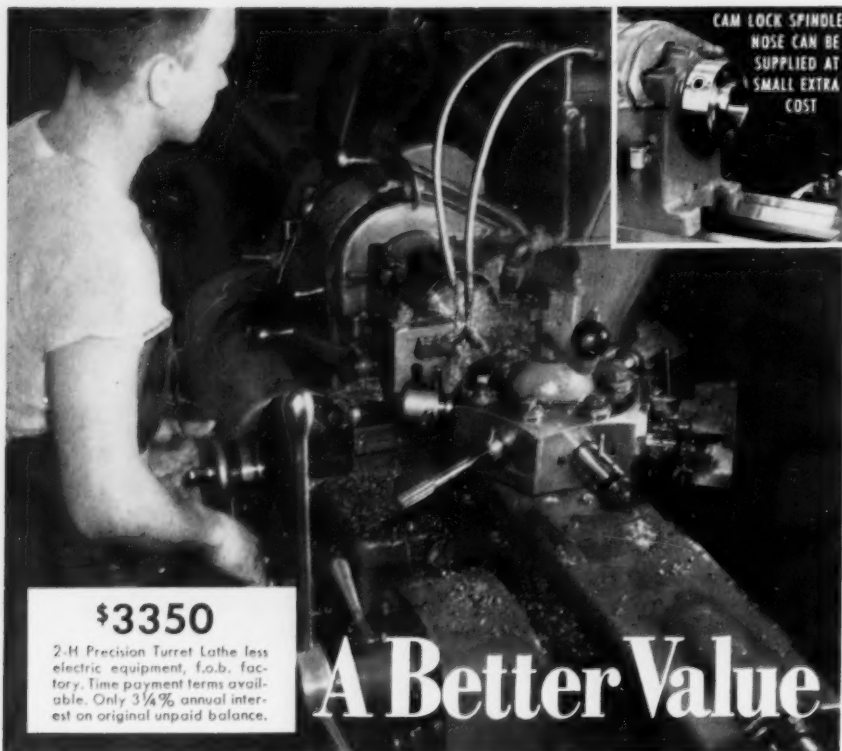
Head Office and Export Department: 78 River Street, Springfield, Vermont.

Branch Offices: 319 Fisher Building, Detroit 2 • 5835 West North Avenue, Chicago 39

2206 Empire State Building, New York 1 • 6214 West Manchester Avenue, Los Angeles 45.

Fellows Gear Production Equipment

For more data circle 254 on Reader Service Card



**CAM LOCK SPINDLE
NOSE CAN BE
SUPPLIED AT
SMALL EXTRA
COST**

\$3350

2-H Precision Turret Lathe less electric equipment, f.o.b. factory. Time payment terms available. Only 3 1/4% annual interest on original unpaid balance.

A Better Value

SPECIFICATIONS

Hole through spindle..... 1 3/8"
Collet capacity..... 1" max.
Swing over bed..... 16 1/4"
Spindle speeds..... 20 to 945
r.p.m. approx.
Effective feed of turret slide 5/8"
Thread cutting
range..... 4 to 224 per inch



The South Bend 2-H Turret Lathe has the stamina for exacting close-tolerance work, rigidity for fine finishes and ample power for smooth performance. Its quick change gear mechanism powers 48 turret ram feeds, 48 carriage longitudinal feeds and 48 cross slide feeds. The wide selection of feeds insures maximum efficiency on every type of operation. Where can you find a better turret lathe value?

DUPLEX TURRET TOOL HOLDER

With this Duplex Turret Holder, two tools can be mounted on one face of turret head. Shank of tool holder fits into turret head and tools are mounted in holder. Priced from \$29.00.

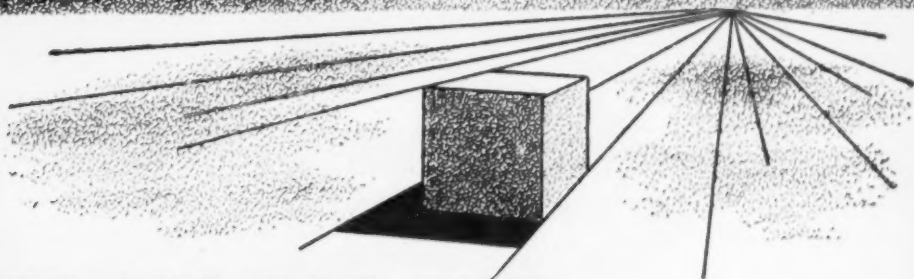


SOUTH BEND LATHE

SOUTH BEND 22, INDIANA

For more data circle 255 on Reader Service Card

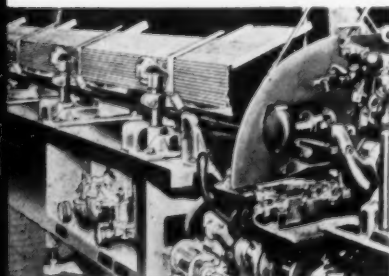
Through the 4th Dimension Time Barrier to New Production Highs



LIPE AML BAR FEED

gears machine production to the steady flow of Time

All industrial results are achieved in Time . . . vital 4th dimension that measures output, costs, profit. Shorten the time gap between operations . . . shorten the time when machines are "cutting air" . . . keep machines producing at a steady optimum rate during the fatigue slow-down from 10:30 to noon, and from 3 P.M., till closing time . . . and you are getting 4th Dimension production. Production that is geared to the steady flow of Time.



**Lipe AML Bar Feed Produces from 30% to 100%
More Output by Eliminating Time Losses**

Time losses account for the enormous differences in output among workmen. By eliminating these losses automatically, the Lipe AML Bar Feed boosts overall production from 30% to 100%. That's because stock is fed to the machine independent of the operator. Constant pressure behind the stock assures uniform speed of feed. No feed fingers to fail or mar stock. No multiple feed-outs, even on the longest pieces.

Mail the coupon now for
free literature giving
full details on the Lipe
AML Bar Feed.



LIPE-ROLLWAY CORPORATION
Syracuse 4, N. Y.

Sure, I'd like to know more about the Lipe AML Bar Feed. Send me your free booklet.

Name _____ Title _____

Company _____

Street _____

P.O. _____ Zone _____ State _____



only with **BARNESDRIL**
HONING TOOLS
AND
ABRASIVES



do you get these FEATURES!

Maximum Body Support at Cutting Edge

— freer cutting action and less spalling
Extended Stone Life

— Plas-T-Clad stones are "extra-deep", provide more useable stone with positive support to the cutting edge.

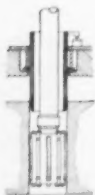
Automatic Compensation for Stone Wear

— Electronic Feed automatically adjusts pressure of stone against work to compensate for stone wear.

Plugmatic Sizing for Bore-to-Bore Accuracy

— sizes bore directly, is self-aligning, and not affected by stone wear.

Plugmatic Sizing



WRITE FOR CATALOG 500A



BARNES DRILL CO.

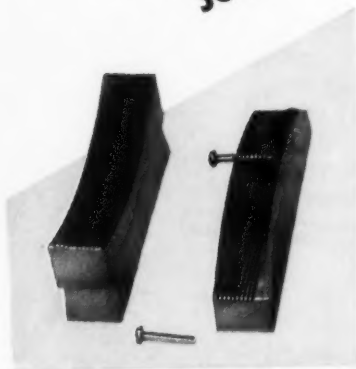
860 CHESTNUT STREET • ROCKFORD, ILLINOIS

For more data circle 257 on Reader Service Card

Prutton

THREAD ROLLING MACHINERY

**WOOD
AND
SHEET METAL
SCREWS**



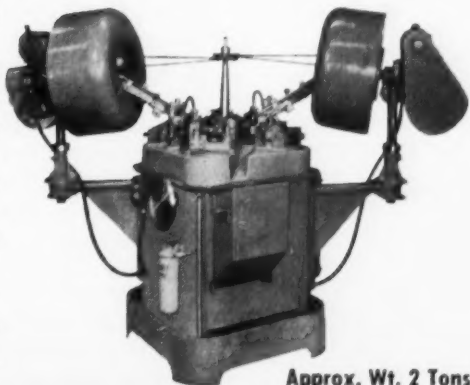
In addition to Type A and Type B Sheet Metal Screws (at a maximum capacity of No. 12 diameter by 2" thread length), Prutton Thread Rolling Machines also produce Wood Screws and Twin-fast Wood Screws at record breaking production rates.

Boost your production! Increase your profits! Submit your parts for our recommendations. No obligation, whatsoever.

**UP TO 25,000 PCS.
PER HOUR!...**

Prutton Exclusive Planetary Dies and Thread Rolling Machines are setting new records in regular production of wood and sheet metal screws. The special designed dies are in sections inserted in a planetary holder; easily and economically replaced in case of excessive wear of any part.

The male and female dies shown, roll precision close-tolerance threads to an end point from blanks with square end.



Approx. Wt. 2 Tons

Prutton Corporation

5295 WEST 130th ST.

CLEVELAND 30, OHIO

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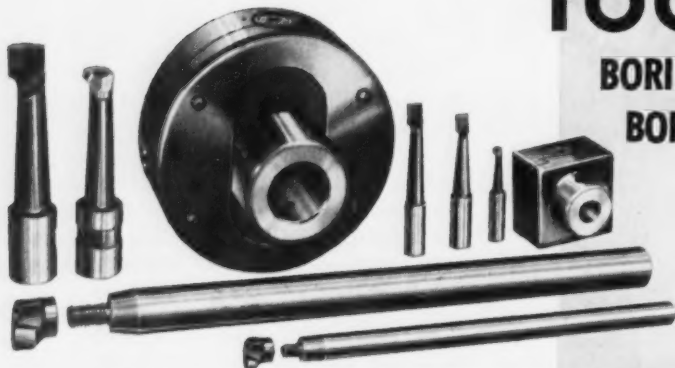
January, 1956

modern machine shop 59

for more *Accurate* cuts...
greater *Rigidity* in

BORING TOOLS

BORING HEADS
BORING BARS



Use **CRITERION** BORING EQUIPMENT

BORING PROBLEMS? CLOSE TOLERANCE?

Try Criterion Boring Tools. Built with the same care and quality as the time-tested Criterion Boring Head.

THIS COMBINATION WILL PRODUCE RESULTS.

Boring heads from 1½ to 7 inch diameter. Boring tools, carbide or high speed steel, ¾ to 1¾ inches diameter. Bore holes from ¼ to 20 inch diameter.

Accuracy for the closest tolerance • Rigidity for the heavy cuts • Heat-treated parts for long wear

LARGE OFFSET SAVES TIME AND TOOL CHANGES

These tools will cut your boring costs.

See the complete line of **CRITERION TOOL PRODUCTS** at your local dealers or write for free catalog.

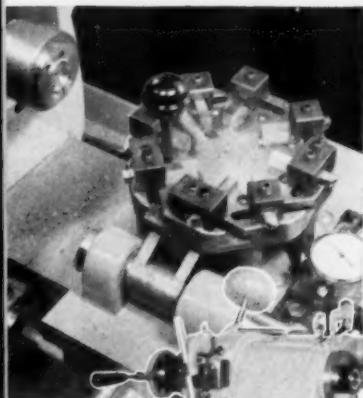
**CRITERION
MACHINE WORKS**

765 WEST 16TH ST. • COSTA MESA, CALIF.

For more data circle 259 on Reader Service Card

HARDINGE
ELMIRA, N.Y.

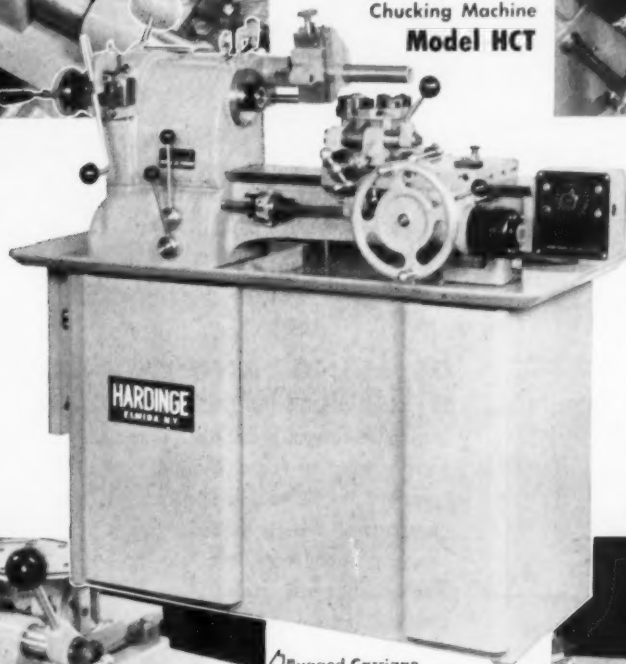
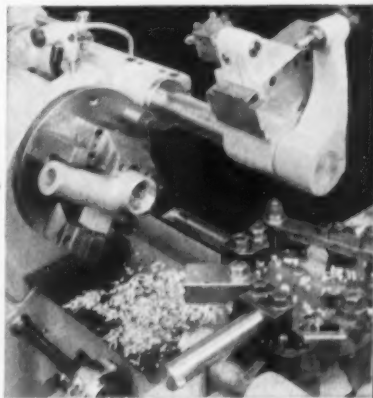
"Closer Tolerances Increase Demand for the HARDINGE HCT Precision Chucking Machine"



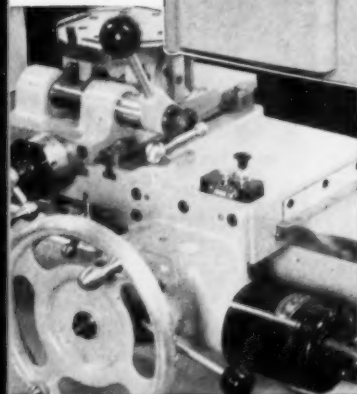
◊ 8-Station Turret

Flexible Range of Operation ◊

High Speed Precision
Chucking Machine
Model HCT



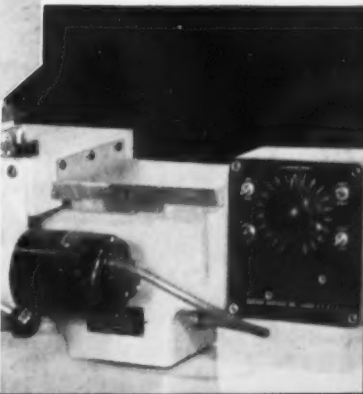
Hardinge Model HCT
Precision Chucking Machine
finishes diameters, recesses,
shoulders, back faces,
front faces, and
cuts precision threads
in one setting - all concentric
with each other.
Tooled inexpensively with
standard tool bits.



◊ Rugged Carriage

Independent Variable
Carriage Feed ◊

For complete
information
write for
Bulletin HCT



HARDINGE BROTHERS, INC., ELMIRA, N. Y.

"PERFORMANCE HAS ESTABLISHED LEADERSHIP FOR HARDINGE"



FOOTBURT

FOR *faster* RADIAL

DRILLING AND TAPPING

■ Hammond Radial Drilling and Tapping Machines may be spotted in the production line for drilling, tapping or reaming. With its unique Bracket Type construction the spindle can be swung quickly from hole to hole. Six Quick Speed Changes are instantly available and the Hammond Tapping Reverse is very fast and convenient to operate.

THE FOOTE-BURT COMPANY • Cleveland 8, Ohio

Detroit Office: General Motors Building

*engineered
for
production*

FOOTBURT MACHINE TOOLS

For more data circle 261 on Reader Service Card

LOOK FOR THESE FEATURES
IN DRILL JIG BUSHINGS

EX-CELL-O

HAS THEM ALL



- ☒ MATERIAL . . high chrome and carbon bearing steel for maximum wear.
 - ☒ FINISH . . precision ground inside and out, and under the head for perfect bearing.
 - ☒ CONCENTRICITY . . assured by grinding on arbors after the holes are finished.
 - ☒ HARDNESS . . deep-hardened to 62-64 Rockwell "C" in automatic equipment.
 - ☒ UNIFORMITY . . of material, dimensions, finish, and hardness.
 - ☒ PROMPT DELIVERY . . from stocks of standard sizes in Detroit, New York, Los Angeles, and London, Canada.
 - ☒ REPUTATION . . largest bushing users in the country are Ex-Cell-O customers.
- Write for Bushing Catalog.

54-32

XLO

EX-CELL-O FOR PRECISION

EX-CELL-O CORPORATION

DETROIT 32, MICHIGAN

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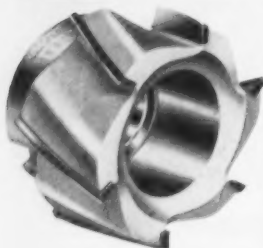
January, 1956

modern machine shop 63

6 new ways to cut floor-to-floor time!

"Helicarb" milling cutters have a constant included cutting angle. The cutting load is uniformly distributed over the full length of the cutting edge. Cutters stay sharp longer, give far better dimensional control, better finishes, and greater stock removal. On many jobs, rough and finish cuts can be combined. Floor-to-floor time is drastically cut, reducing per-part cost.

These new cutters fully utilize the new advances in machine tool design. More and more shops—those that want a competitive edge—are using them. Why not you?



Shell Mills



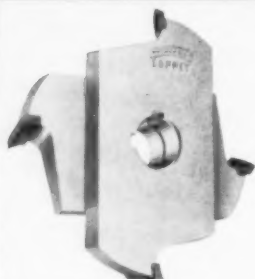
End Mills



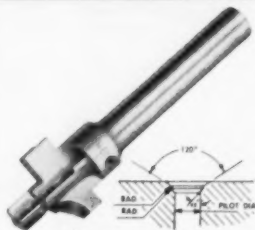
Slob Mills



Staggered-Tooth Side Mills



Interlocking Side or Straddle Mills



Attention! Hydraulic Parts Producers
If you produce A.N.D. 10050 part contours, investigate the Sonnet A.N.D. Port Contour Cutter that completes five operations in one pass!

HELICARB
TRADE MARK

The original line of standard helical carbide milling cutters.

Manufactured by Sonnet Tool & Mfg. Co., 576 North Prairie Avenue, Hawthorne, California

For more data circle 263 on Reader Service Card

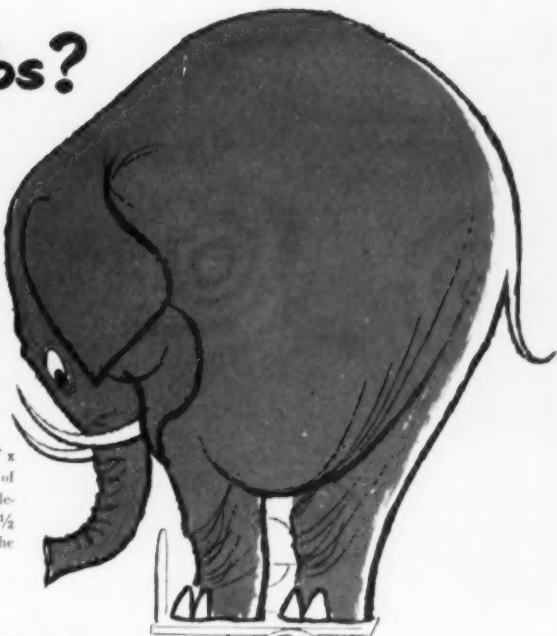
Jumbo Jobs?

Sure ... on an

ABRASIVE

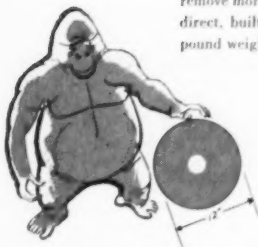
No. 1½

Because the Abrasive 1½ table has a 10" x 15" chuck with a full 150 square inches of surface area. A big handfeed grinder designed to do more, more easily, the 1½ gives you a full 12" capacity under the wheel. A lot of grinder for the money.



A GORILLA FOR WEAR

A gorilla for wear, the No. 1½ takes a 12" wheel. This gives you more cutting surface, more pieces between dressings. You can remove more stock per pass, too, because of direct, built-in spindle power and the 200 pound weight of the wheel slide and motor.



ABRASIVE
Machine Tool Company

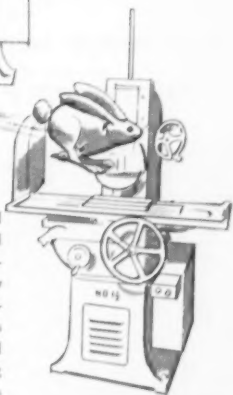
East Providence 14, R. I.

For Forty Years
First For Accuracy — Economy

FAST AS A RABBIT

Fast as a rabbit, the No. 1½ precision tool room grinder with Electrabrative control saves you time, gives more precision, maintains finish and eases operation. A big, new feature, the Electrabrative stepless, variable-speed spindle electronically maintains a constant 5500 peripheral surface speed from a 12" to a 6" wheel, while maintaining effective torque. To operate all you do is set the knob on the wheel head!

A two-cent post card will bring you this whole story on the BIGGEST little grinder on the market.



ABRASIVE

PRECISION GRINDERS

For more data circle 264 on Reader Service Card

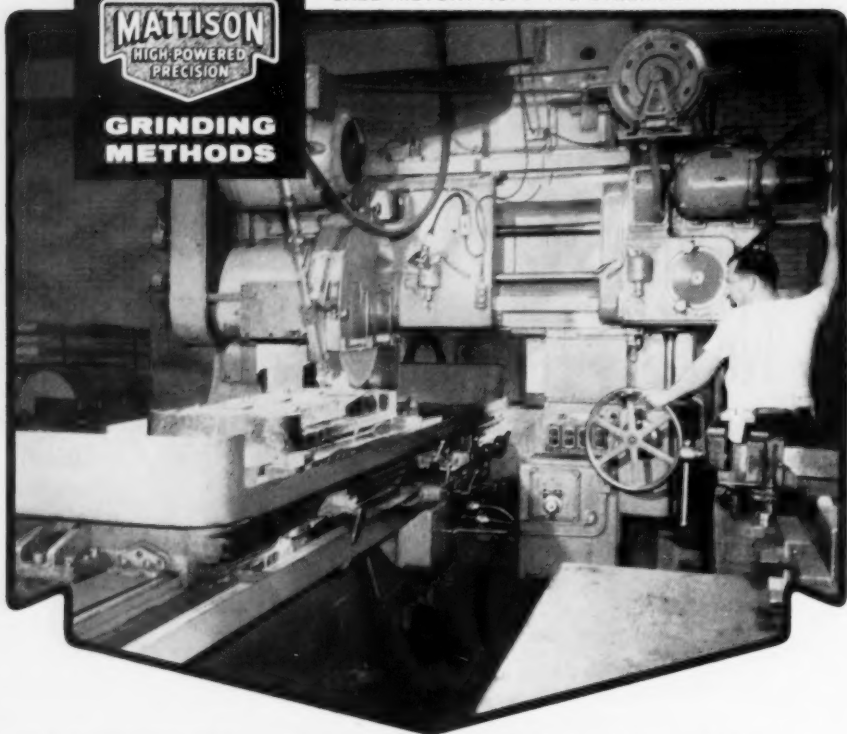
January, 1956

modern machine shop 65



GRINDING METHODS

CASE HISTORY NO. 9 - H-C STEEL BLANKING DIES



Accuracy upgraded from .006 in. to .0003 in.

sharpening large blanking dies on the "Plano"

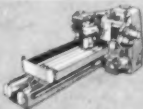


Operators set up male blanking die on Plano Grinder where it is ground with speed and precision.

This male blanking die of high carbon, high chrome Ontario steel is being ground on the Mattison Plano Horizontal Spindle Surface Grinder. Accuracy is maintained to .0003 in. compared to .006 in., which was the closest tolerance formerly held. Floor-to-floor time has been reduced from 3 hours to 1½ hours. Improved finish is another benefit gained.

The Plano Grinder is unexcelled for grinding flat and "V" ways; long, narrow work; large, flat surfaces; plates; dies and jigs. Write for Bulletin No. 345.

Mattison Machine Works, Rockford, Illinois, U. S. A.

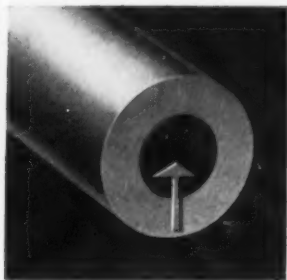


**HIGH-POWERED
PRECISION
SURFACE GRINDERS**

For more data circle 265 on Reader Service Card



a hole here costs money . . .



a hole here saves money

Crucible Hollow Tool Steel Bars put savings into the pockets of the metal-working industry. There's no need for costly drilling, boring, cutting-off or rough-facing operations. For the hole is already in the steel you buy. You save production time, machine capacity — avoid scrap losses.

Crucible Hollow Tool Steel Bars are now available in any of our famous tool steel grades . . . in almost any combination of O.D. and I.D. sizes. And you get *immediate* delivery of five popular grades — KETOS oil-hardening, SANDERSON water-hardening, AIRDI 150 high-carbon high-chromium, AIRKOOL air-hardening, and NU DIE V hot-work tool steels.

Your Crucible representative can show you how to save time and money with Crucible Hollow Tool Steel. *Crucible Steel Company of America, Henry W. Oliver Building, Pittsburgh 30, Pa.*

CRUCIBLE

first name in special purpose steels

Crucible Steel Company of America

For more data circle 256 on Reader Service Card

January, 1956

modern machine shop 67

Here's what the
SUNNEN
 folks wrote
 us recently
 about their
 Sidney Lathes:

SUNNEN PRODUCTS COMPANY
Automatic Surface Equipment • Precision Heavy Machinery

1910 MANCHESTER AVENUE ST. LOUIS 17, MISSOURI

Our 16" Sidney has proved to be everything Sidney said it would be.

We have made many odd shaped dies and it will duplicate as accurately as a master part or template.

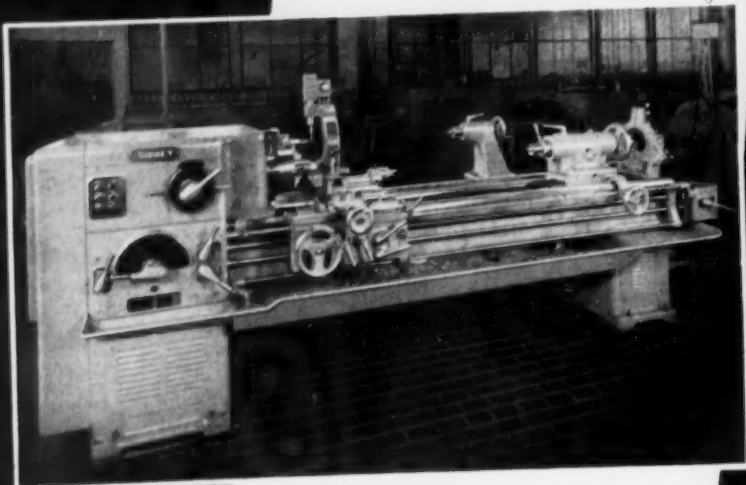
The Sidney is also easy to operate, the height is just right and all levers are conveniently located.

It is a real pleasure to operate a Sidney.

George Meechling
 Tool Room Foreman

Cordially,
 SUNNEN PRODUCTS COMPANY

Geo Meechling



SIDNEY
 FLUID TRACER
 LATHES

For you . . . as well as for Sunnen Products Company of St. Louis and scores of other leading makers of precision equipment . . . Sidney Lathes can do a terrific job . . . **ECONOMICALLY!**

The sensitive tracer head transfers every change in contour from any master piece or template to the cutting tool. A separate control switch turns off the tracer motor while the machine is performing standard lathe work.

WRITE FOR BULLETINS

THE SIDNEY MACHINE TOOL CO. • SIDNEY, OHIO

Builders of Precision Machinery since 1904

For more data circle 267 on Reader Service Card

**Want to Save Money
in YOUR Tool Room?**



THEN get a handy NORBIDE® Dressing Stick from your local Norton distributor. You'll find it's just the thing for cleaning up a wheel face, forming a radius or touching up a tool wheel in a jiffy!

You'll find too that with one of these light, easy-to-grip sticks you can see more of the wheel face and avoid costly overdressing. And it will greatly reduce dust nuisance too.

Better yet, a NORBIDE Stick of Boron Carbide — the hardest man-made material commercially available — will outlast hundreds of ordinary sticks.

Order one today or write for Form 1567 giving more details.

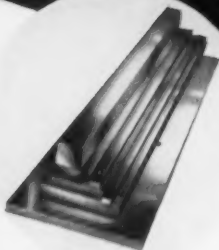
NORTON COMPANY
49 New Bond St., Worcester 6, Mass.



*Next to the diamond in hardness —
available at a fraction of diamond cost*

For more data circle 268 on Reader Service Card

Here Are 5 Reasons Why Tool and Die Costs Drop With DoALL Precision Ground Die Steel



SAVES TIME—It's ready for use . . . eliminates costly, time-consuming machining required to rough grind ordinary hot rolled tool steel to size.

PRECISION GROUND—Super-fine finish is 25 micro-inches R.M.S. All sides and edges are ground to within the following tolerances: Thickness—plus or minus .001"; width—plus .005" minus .000"; edges square to face of bar within 10 minutes of a degree.



EASY TO MACHINE—Uniformly and completely annealed . . . free of decarburized surface and other defects.

HIGH QUALITY—Guaranteed, none finer. This is fine grained, electric furnace, oil hardening tool steel—the non-deforming type to assure utmost accuracy.

GREATEST SELECTION OF SIZES—The most complete selection of standard sizes available for immediate delivery. No waste; stock size to match nearly every need—and many special sizes can be furnished promptly.

Order DoALL Precision Ground Tool and Die Steel from your local DoALL Service Store. Over 1000 standard sizes in oil and air hardening to choose from.

Literature available—no obligation. Write:

A Proven
Oil Hardening
Analysis:

Carbon	0.90%
Manganese	1.20%
Silicon	0.30%
Tungsten	0.50%
Chromium	0.50%

DoALL

The DoALL Company

254 N. Laurel Ave., Des Plaines, Ill.

TS-14

NEW!
"Spray-on"
Steel Ink.
Fast, easy,
economical

Machine Tools

Saw Bands

Measuring Instruments

Cutting Tools in Stock

For more data circle 269 on Reader Service Card

TAPS *by Card*



*Presenting the
Symbol of Service*

YOUR CARD DISTRIBUTOR

When you specify Taps or Gages by Card, you know you're getting the finest. Card's long experience in the manufacture of precision tools is your guarantee of satisfaction. In every industry the superior performance of Card taps and gages is speeding production, helping to turn out better products faster.



S. W. CARD MANUFACTURING CO., Mansfield, Massachusetts
Division of UNION TWIST DRILL COMPANY

GAGES *by Card*

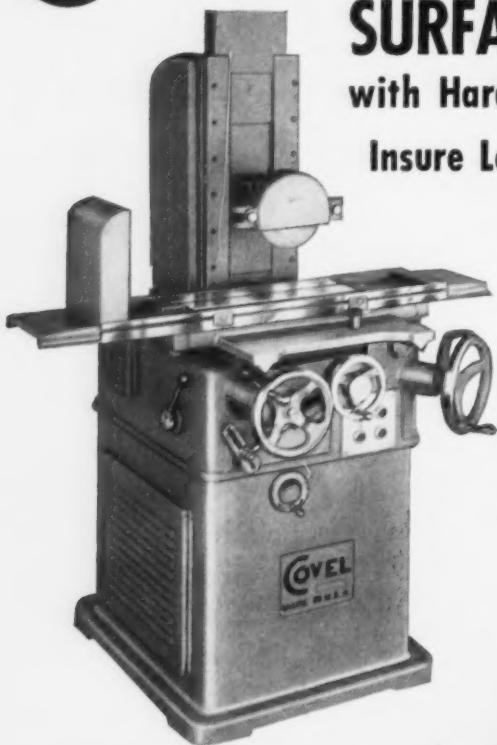
TAPS • DIES • SCREW PLATES • GAGES

For more data circle 270 on Reader Service Card

COVEL No.10 ^{6" x 18"} **HAND OR POWER FEED** **SURFACE GRINDERS** with Hard Chrome Table Ways

Insure Long-Lasting Accuracy...

Lower Costs

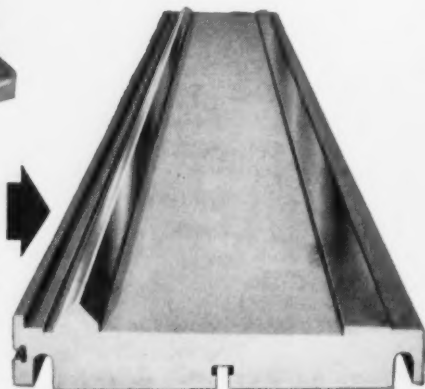


Replace old, inaccurate grinders now with this low-priced, precision-built, easy-to-operate grinder with latest bed-type construction. Cut manufacturing and maintenance costs on gage, form tool and all-around tool room grinding.

Hard Chrome Table Ways Reduce Maintenance Costs

Expensive, time-consuming rescraping of ways is eliminated through Covels special plating process. The Vee and flat ways on tables in service over five years, finished with this wear-resistant surface, show very slight wear, no flaking and no loss of the original built-in precision.

Send for descriptive Bulletin M-16.



COVEL **PRECISION GRINDERS**

**BENTON HARBOR
MICHIGAN**

HYDRAULIC & HAND FEED SURFACE GRINDERS • UNIVERSAL CUTTER & TOOL GRINDERS • DRILL GRINDERS

For more data circle 271 on Reader Service Card

"AMERICANS" WORKING FOR NORDBERG

These "AMERICAN" Track Type Hole Wizard Radials mounted on mobile bases speed up drilling, tapping and boring operations in long, heavy work pieces by bringing the tool to the work rather than moving the work to the tool.

The work pieces are mounted in elaborate trunnion jig fixtures so different work planes may quickly be presented to the tool and a high degree of accuracy maintained.

The quality of Nordberg products is universally recognized. We are proud indeed that so many "AMERICAN" Lathes and Radial Drills contribute to it.

helping to profitably
produce the quality
products for which
Nordberg Manufacturing
Company of
Milwaukee, Wisconsin
is known the world
over.

For more work at lower cost...



THE AMERICAN TOOL WORKS CO.

Cincinnati 2, Ohio, U. S. A.

Tough grinding jobs?

Check **Vulcanaire**
high speed precision
grinding heads!

Many seemingly impossible grinding problems have been solved by adapting Vulcanaire to standard machines or by using one of Vulcan's specially designed machines.

On Surface Grinders, merely remove wheel and guard, clamp vertical or horizontal adaptor to machine as illustrated. No belts necessary. For instance, Vulcanaire used in connection with Vulcan's Rotary Table for Surface Grinders permits the grinding of a circular slot.

Adaptors are in stock to fit the spindle of Vertical Milling Machines for grinding contours, holes and slots.

On Internal Grinding Machines Vulcanaire's infinitely controlled speeds furnish the correct surface cutting speed resulting in faster production and micro finish. The adaptor sleeve fits into present housing.

Applied to Jig Boring Machines, Vulcanaire is liked by leading precision manufacturers because its accuracy is guaranteed, producing Vulcanaire jig grinding of large and small parts.

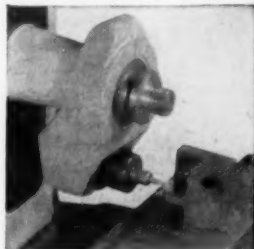
Send us a blue print on your toughest grinding problem. Recommendations and sketches will be returned to you — no obligation.



Grinding circular slot using Vulcan's Rotary Table and Magnetic chuck.



Vertical adaptor for Surface Grinders. Grinding small slots



Horizontal application Grinding a Shoulder Punch.

Major Vulcan Services

Engineering, Processing, Designing and Building . . . Special Tools . . . Dies . . . Special Machines . . . Vulcamatic Transfer Machines . . . Automation . . . including the Vulcan Hydraulics that Form, Pierce, Assemble and size. Vulcanaire Jig Grinders . . . Motorized Rotary Tables . . . Plastic Tooling.

for
**HEAVY DUTY
and
BOSSED DIES**



Lamina
**RING CLAMP
GUIDE
BUSHINGS**

EXCLUSIVE HIGH-STRENGTH DESIGN

Lamina Ring Clamp Guide Bushings are designed expressly for use on heavy duty and bossed dies where large diameter pins are required. Due to the fact that the guide pin contacts the bushing at a point beyond the bearing face of the bushing head, the possibility of the head breaking off is eliminated.

SIMPLE, COST-SAVING ASSEMBLY

Like all other Lamina Guide Bushings, these heavy duty bushings are assembled with a wring fit in the shoe. Lamina Ring Clamp Bushings also are prefinished by precision honing at our plant. This not only eliminates distortion but saves considerable assembly time, effort and handling of large, heavy shoes.

AVAILABLE IN TWO MATERIALS

Lamina Ring Clamp Guide Bushings are available in both solid Ampco bronze and in hardened steel with bronze plated on the I.D. This latter bushing offers the ideal combination of long wear characteristic of hardened steel and the free-running action of bronze.



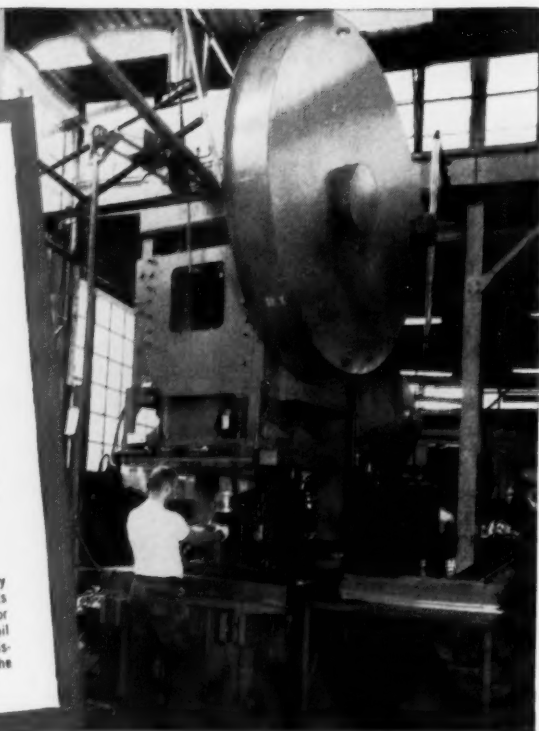
For more data circle 274 on Reader Service Card

*Another job done better
on a **Verson** press!*

**NOW O.B.I.
FORMING
GOES BIG
IN THIS**

Verson
PRESS

• 250 ton Verson O.B.I. used by Industrial Wire Cloth Products Company, Wayne, Michigan, for forming valve head covers, oil filters (shown here) and miscellaneous stampings for the custom automobile trade.



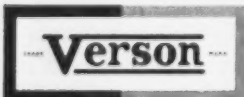
Catalog OB-54 gives Verson O.B.I. specifications and design details. Write for your copy.

Economy, convenience and versatility—these are the reasons for the expanding use of Verson Open Back Inclined Presses, even on big capacity jobs like the one illustrated.

In Verson O.B.I.'s you get design and construction features normally associated with large, costly specialized machines . . . and you get the liberal slide and bed area, stroke length and depth of throat that assures their adaptability to jobs well beyond ordinary ideas of the O.B.I.'s limits.

Verson O.B.I.'s are available in capacities ranging from 90 to 250 tons in standard and special types. Let us go over your requirements with you and show you how Verson O.B.I. Presses can help you to lower costs.

A Verson Press for every job from 60 tons up.



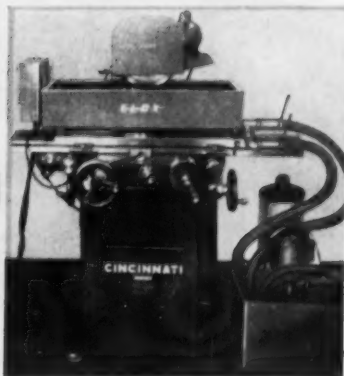
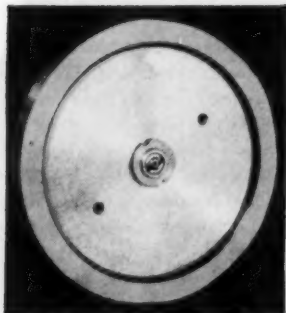
ORIGINATORS AND PIONEERS OF ALLSTEEL STAMPING PRESS CONSTRUCTION

VERSON ALLSTEEL PRESS CO.

9310 S. Kenwood Avenue, Chicago 19, Illinois
So. Lamar at Ledbetter Drive, Dallas, Texas

**MECHANICAL AND HYDRAULIC PRESSES AND PRESS BRAKES • TRANSMAT PRESSES
TOOLING • DIE CUSHIONS • Verson-WHEELON HYDRAULIC PRESSES**

For more data circle 275 on Reader Service Card



100% more pieces per grind
300% less tools required per job
400% savings in monthly tool cost

the superiority of
ELOX electrical
 discharge
 grinding was
 proved by this
 large automotive
 company's**
 unsolicited 2-month
 comparison report!

Tool Name, Description:	Solid Carbide Insert	
Part Name:	Crankshaft	
Operation Name:	Finish Front & Rear Thrust Bearings	
	Standard Grind	Elox EDM Grind
TOTAL PIECES PER TOOL	17,290	95,904
MINUTES PER GRIND	21.0	13.75
COST PER GRIND	\$ 1.26	\$.83
ESTIMATED MONTHLY TOOL COST	\$294.71	\$92.19

in writing

Elox will guarantee increased tool productivity over any type of abrasive grinding.

Other Elox equipment available to remove broken taps, drills, etc., from \$495 to \$3450.

elox

corporation of michigan

739 N. ROCHESTER ROAD

CLAWSON, MICHIGAN

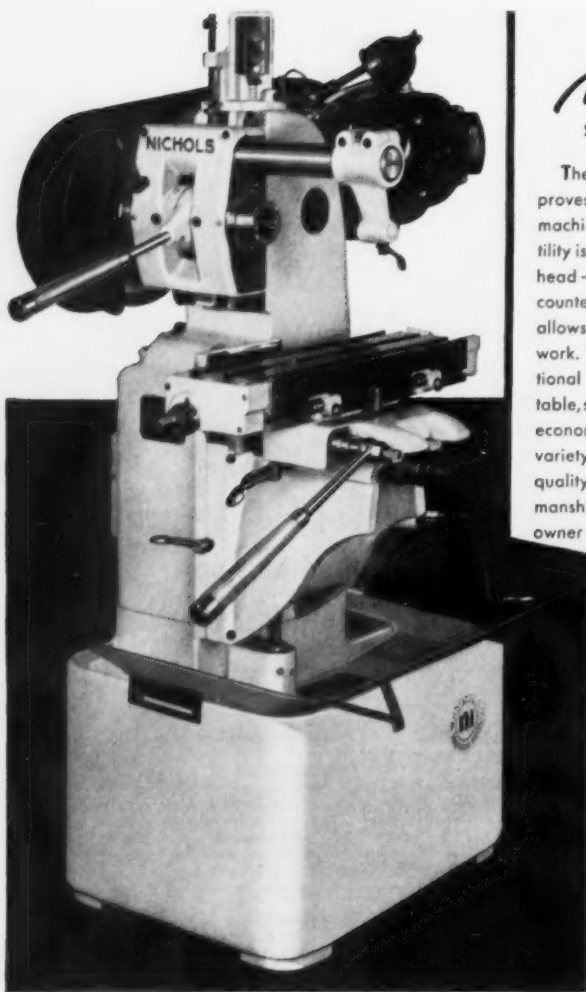
**Comprehensive report and company name given on request.

*T. M. Reg.

For more data circle 276 on Reader Service Card

January, 1956

modern machine shop 77



Nichols Miller STANDARD MODEL

The Standard Nichols Miller often proves to be the handiest (and busiest) machine in the shop. Its unusual versatility is due to the "rise and fall" spindle head—the spindle being mounted in a counter-balanced sliding head which allows the cutter to be brought to the work. This unique feature, plus conventional screw or lever movements of table, saddle and knee, guarantees fast, economical production on the widest variety of parts. And the unexcelled quality of Nichols' design and workmanship commands the respect of every owner and operator.

*"the miller that
uses its head!"*

CONDENSED SPECIFICATIONS

Table Working Surface	6 $\frac{1}{2}$ " x 21" or 30"
Longitudinal Travel	10" or 19"
Transverse Travel	7"
Vertical Travel—Knee	13 $\frac{1}{2}$ "
Rise and Fall of Spindle	4 $\frac{1}{2}$ "
Selective Speed Ranges up to 5000 R.P.M.	
Weight	1250 lbs.

ASTE Show, Chicago, Booth 351

Write today for the Nichols general catalog, which describes the six models of Nichols Millers. A sound, color movie, "the Miller that Uses its Head" is available for free showing. May we reserve it for you?



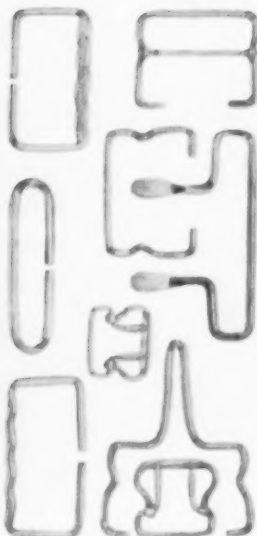
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NATIONAL DISTRIBUTORS **NICHOLS-MORRIS CORPORATION**

76-H MAMARONECK AVE.
WHITE PLAINS, N. Y.

For more data circle 277 on Reader Service Card

Anaconda Wire now available in New Pay-off Container



Shutdowns to change coils in wire forming machines cut 90% at West Haven Buckle Company

The West Haven Buckle Company of West Haven, Conn., used to be limited to relatively light coils of brass wire because of the slide feed necessary for free pay-off into its wire forming machines. Machines could operate less than an hour before shutdown to feed in another coil.

When they started using Anaconda Wire packaged in the new pay-off barrel, which provides free pay-off, the runs were increased 10 times. The big coils of brass wire—400 to 500 pounds—made possible continuous runs of from 8 to 9 hours. This cut the time lost in changing coils 90 per cent. It eliminated the labor of shifting and lifting heavy coils—as the wire is fed directly from the barrel.

An easy way to increase production, cut costs: Big coils of Anaconda Wire in the new pay-off barrel give you these advantages:

1. Reduced down-time to change coils can mean production increases up to 25 per cent. Free pay-off feature may enable you to increase machine speed for still greater production.
2. Operators are freed for other duties during the longer continuous runs.
3. Easier handling, better inventory control. Barrels are clearly marked for quick identification—are easily handled by standard hand trucks—utilize storage space efficiently—can be stacked. Losses are minimized because coils stay clean indefinitely—there is no danger of coils becoming tangled or mixed.

No extra charge for Anaconda Wire in the new pay-off container. Call your American Brass Company representative today or write: The American Brass Company, Waterbury 20, Conn.

5285



THE NEW CONTAINER which provides Anaconda Wire in 400 to 500 pound coils, ready for free pay-off into pin machines and other automatic forming machinery. Anaconda wire in all alloys is available packaged this way for long, continuous runs—in all gauges up to .090", in tempers at least one number hard.

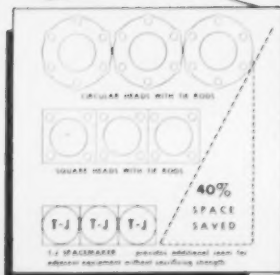
ANACONDA®

COPPER AND COPPER ALLOY WIRE

For more data circle 278 on Reader Service Card

**DELIVERY
OFF THE SHELF**

**IN 64,000
COMBINATIONS**



See us in
Fluid Power Area
ASTE Show
Booth 225

(T-J)
**Spacemaker
CYLINDERS**

**OUTMODE ALL OTHERS
... SAVE 40% SPACE!**

You'll never go back to tie-rod cylinders, once you apply T-J Spacemakers to your push-pull-lift jobs! Advantages in space saved, weight saved, greater strength and off-the-shelf delivery are among the dozens of Extras you get as Standard!

Now—these sensationally popular T-J Spacemaker Cylinders are available off the shelf in sizes up to 8". This means as many as 64,000 different combinations of styles, bores, strokes, mountings, etc. immediately available! Oil pressure to 750—Air to 200 P.S.I. Super Cushion Flexible Seals for Air... New Self-Aligning Master Oil Cushion. Hard chrome plated bodies and piston rods (Standard). Only from T-J can you get these new ingenious cushion designs! Send for bulletin SM-155-2. The Tomkins-Johnson Co., Jackson, Mich.

Member of the
National Fluid Power Association

(T-J)
TOMKINS-JOHNSON
PNEUMATIC, AIR AND HYDRAULIC CYLINDERS, COILS, COILCHAMS

For more data circle 279 on Reader Service Card



switch **A ~~STITCH~~ IN TIME . . .**

If you are trying to patch up holes in your production schedule, then it's high time that you switched to CIMCOOL®, the world's largest selling chemical cutting fluid. Here's how CIMCOOL can save you money and increase your production.

- **CIMCOOL INCREASES TOOL LIFE** (and thus reduces downtime) because of its chemical lubricity.
- **FASTER SPEEDS** are possible because CIMCOOL cools faster, for it combines friction reduction and cooling capacity in a degree never before attained.
- **CIMCOOL COSTS LESS** than old-fashioned cutting fluids because it lasts longer. It also cuts labor costs for cleaning and changing. And because of its low surface tension and low adhesion to work and chips, there is practically no carry off.

Let us tell you about the other advantages—soon. Wire, write or telephone Sales Manager, Cincinnati Milling Products Division, The Cincinnati Milling Machine Co., Cincinnati 9, Ohio.

*Trade Mark Reg. U.S. Pat. Off.

CIMCOOL CUTTING FLUIDS

CIMCOOL Concentrate—The famous pink fluid which still covers 85% of all metal cutting jobs. Effective, economical and clean.

CIMCOOL Tapping Compound—Permits the use of highest tapping speeds and increases tap life amazingly.

CIMPLUS—The transparent grinding fluid with exceptional rust control. Also used for machining cast iron and as a water conditioner with CIMCOOL Concentrate.

CIMCUT Base Additive—For jobs requiring an oil-base cutting fluid. Added to mineral oils, it gives an economical mix for higher speeds and feeds.

CIMCOOL Bactericide—The most effective agent yet developed to overcome rancidity and foul odors.

CIMCOOL Machine Cleaner—The two-phase non-corrosive cleaner that removes grit, dirt, slime and oil.

CIMCOOL

Cutting Fluids

for 100% of all metal cutting jobs

PRODUCTION PROVED PRODUCTS OF THE CINCINNATI MILLING MACHINE CO.

Better surface grinding for you... G BOND users' reports prove it!

*Top speed, new economy among many
"TOUCH of GOLD" advantages listed*

Reports from surface grinding customers on the performance of G Bond wheels sound pretty much alike. That's logical, because each customer is getting exactly the advantages he's looking for — *freer, cooler, faster cutting action . . . heavier cuts without burning . . . closer tolerances and smoother finishes . . . easier dressing and more pieces per dressing . . . more work, and more kinds of work, per wheel.*

Your Own Surface Grinding

will benefit by the G Bond's unique ability to hold each abrasive grain just long enough for maximum cutting action — an important "Touch of Gold" advantage that means time and money saved, plus better product quality, throughout the range of precision and semi-precision grinding jobs.

See Your Norton Distributor

for the G Bond wheels, cylinders and segments you need. They're available in a variety of famous Norton abrasives. Of these, 32 ALUNDUM* abrasive is particularly suited for fast stock removal and heavy feeds — it grinds exceptionally cool and fast, with minimum dressing. And remember: only Norton offers you such long experience in both grinding wheels and grinding machines to help you produce more at lower cost. NORTON COMPANY, Worcester 6, Mass. Distributors in all industrial areas, listed under "Grinding Wheels" in your phone directory, yellow pages. *Export:* Norton Behr-Manning Overseas Incorporated, Worcester 6, Mass.

*Trade - Mark Reg. U. S. Pat. Off. and Foreign Countries

W-1645

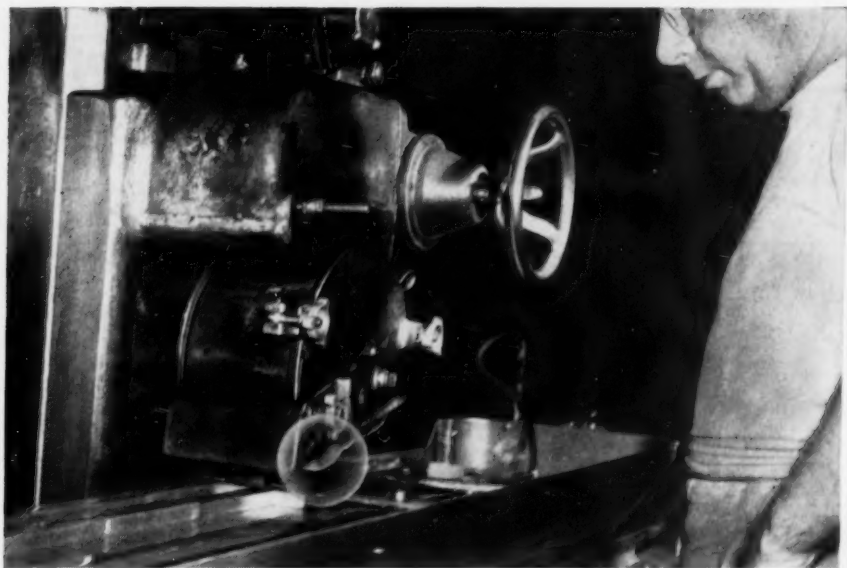


*Making better products...
to make your products better*

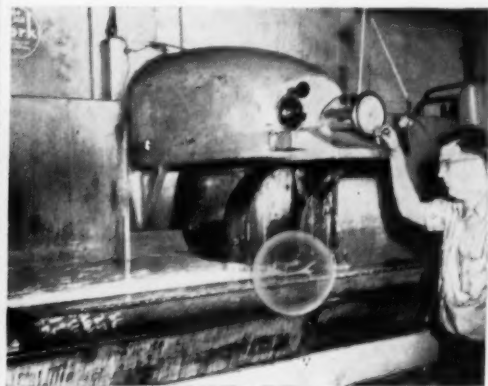
and its BEHR-MANNING division

NORTON COMPANY: Abrasives • Grinding Wheels • Grinding Machines • Refractories
BEHR-MANNING DIVISION: Coated Abrasives • Sharpening Stones • Pressure Sensitive Tapes

For more data circle 282 on Reader Service Card



"Competitive wheels have never equalled G Bond wheels on our jobs." This Massachusetts tool manufacturer further reports G Bond wheels are maximum load production wheels, extremely free cutting, requiring little dressing and giving very long life. His requirements are precision grinding hard steel to a very high finish, and to parallel tolerances of .0001".

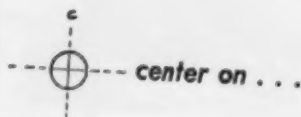
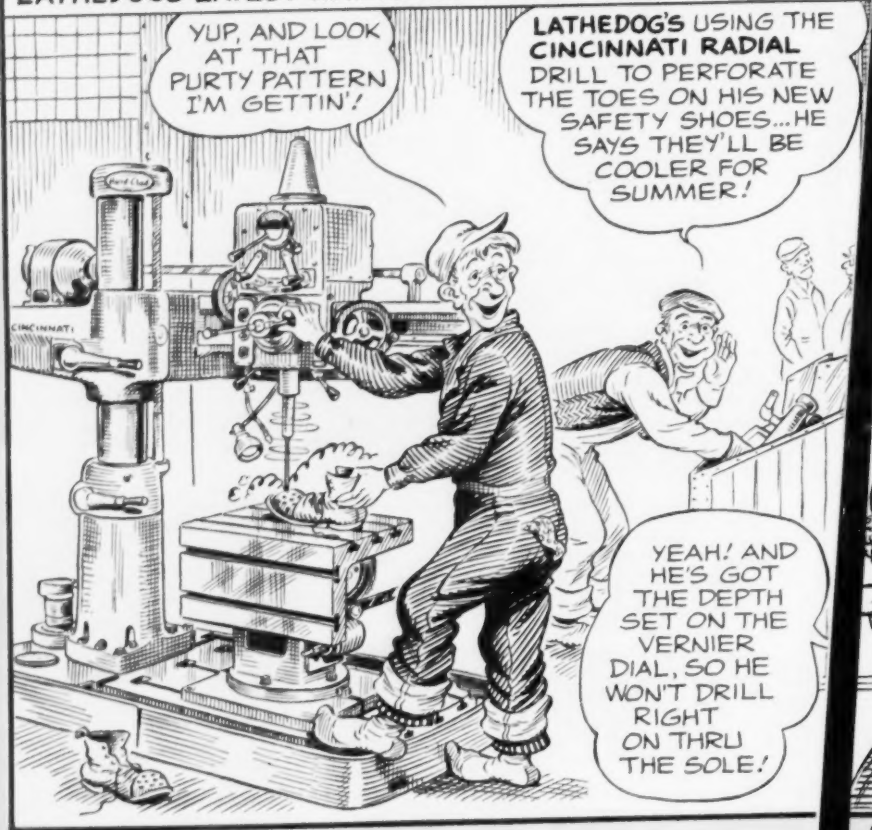


"Norton G Bond wheels are faster and freer cutting," need less dressing than any other wheels we've used," says this Pennsylvania metal working company. Material ground is boiler plate and miscellaneous steel plate. Stock removal rate is 4.5 to 6 cubic inches per minute.



Jigs, fixtures and other parts of miscellaneous steels, besides some of cast iron, are the jobs on which G Bond segments are used by this Ohio tool and gage maker. He credits the G Bond segments with giving a better finish, with less dressing, than any he previously used.

"LATHEDOG'S" LATEST WAY TO USE THE CINCINNATI RADIAL DRILL



cincinnati

DRILL

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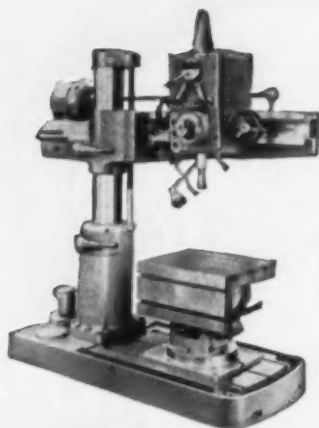
D
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J.R.WILLIAMS

AT 2330
R.P.M.
HE GOES
RIGHT
THRU
THAT
CAP
LIKE
BUTTER!

J.R.WILLIAMS
Copr. 1955 by NEA Service, Inc.

Large-size prints of this
J. R. Williams cartoon are
available.



The Cincinnati 3' 7 1/2" Radial Drill is built around a new Hard-clad column designed for enduring accuracy. Centrifugally cast from high-density iron, Flamatic hardened and ground to close tolerance, this new column provides extreme wear resistance and retains its precision through long service. Operation is easier, too, with speeds and feeds both selected on Cincinnati's exclusive Color Match dials. Drilling capacity of 1 1/4", plus a long list of special features, makes a Cincinnati Radial your best buy for the majority of your drilling jobs.

1. Unit construction throughout
2. Hardened alloy steel gears in feed and speed transmissions
3. Hardened and ground headrail on arm
4. All geared head—forced-spray lubrication
5. 9 spindle speeds
6. Self-contained feed transmission
7. 6 spindle power feeds
8. Multiple-disc clutches for spindle drive
9. Positive jaw feed clutch
10. Universal or box-type tables and right and left-side bases available
11. Free service manual and parts list *delivered with machine*

Cincinnati also makes a complete line of Tray-Top lathes, light-duty floor and bench-type drills.

Get complete catalogs and the name of your local dealer by writing on your company letterhead to Cincinnati Lathe and Tool Co., 3260 Disney, Cincinnati 9, Ohio.

ti

lathes and drills



IT'S
ALL NEW!

it's the greatest advancement in OBI press history

IT'S
THE FIRST!

NIAGARA FRONT-TO-BACK

- ALL NEW** rugged, front-to-back crankshaft with huge crankpins
- ALL NEW** compact, fully concealed driving mechanism
- ALL NEW** enclosed, rigidly supported gearing in sealed oil bath
- ALL NEW** electro-pneumatic friction clutch on crankshaft
- ALL NEW** wider spaced, longer, narrower gibs
- ALL NEW** wider, box type slide all within gibbing
- ALL NEW** precision, hardened, longer-wearing gears
- ALL NEW** compact, straight-line, space-saving frame

Hailed as the greatest achievement in modern OBI press design and performance, by over 100,000 spectators who examined this mechanical marvel at the Machine Tool Show, the all-new Niagara Series E, Single Point, Open Back Inclined Press starts a brand new chapter in press history.

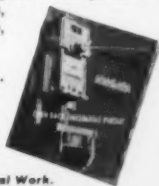
It's years ahead of any OBI ever built. It's an industrial revolution all by itself. No other press, in modern times, embraces so many "All-New" features.

Gone are exposed, overhanging gears, fly-wheel and other mechanisms. Gone is excessive and damaging crankshaft deflection. Here to stay are: Full support to wide dies. Greater

resistance to off-center loading. Accurate alignment of slide, with minimized tendency to cock. Substantially increased die life. Longer lasting, hardened gears. Smoother, safer press performance. Smaller floorspace requirements.

Built in 4 sizes, with shaft diameters from 4 1/2 to 7 1/2 inches and capacities from 75 to 200 tons, the new Series E is available in both standard models and automation models equipped with the most advanced controls and devices for peak production. A complete description of both, with full specifications, is given in new Bulletin 56, sent promptly on request.

SEND FOR NEW BULLETIN . . .



NIAGARA MACHINE & TOOL WORKS • BUFFALO 11, N. Y.

DISTRICT OFFICES: Buffalo • Cleveland • Detroit • New York • Philadelphia

Dealers in principal U. S. cities and major foreign countries.

America's Most Complete Line of Presses, Shears, Machines and Tools for Plate and Sheet Metal Work.

CRANKSHAFT OBI PRESS DESIGN

STANDARD DESIGN

For General Purpose Production

MODIFIED DESIGN

For Automation Lines

BAY STATE TAPS



WHEREVER YOU ARE

Stop bucking inventory problems . . . when you need taps call your nearby Bay State Distributor. He'll make it his business to know your needs and to keep his shelves stocked with the right Bay State Precision Performance Taps and dies for you . . . he'll deliver when you need them, where you need them. Your tapping costs will drop, production and profits will rise . . . contact your Bay State Distributor today.



BAY STATE TAP & DIE COMPANY
MANSFIELD, MASSACHUSETTS

For more data circle 287 on Reader Service Card



New

**KOLLE
MODEL
BSM 40
16
VERTICAL
CUTTING
METAL
BANDSAW**

CONTOUR CUTTING MACHINE

with infinitely variable cutting speeds from 33 to 2378 ft. per minute . . . for sawing, filing, polishing, featuring a table that swivels 15 degrees on ALL FOUR SIDES.

- Hydraulic attachment available for infinitely variable feeds
- All welded steel construction
- Illuminated magnifier
- Butt welder complete with grinding wheel and blade shear
- Circle cutting attachment available

Specifications:

Diameter of saw wheels	15 3/4"
Throat depth	15"
Work Thickness	10"
Size of table	22" x 24"
Motor	1 1/2 H.P.
Height	71"
Width	40"
Floor space	23" x 28"
NET WEIGHT (Approx.)	1,540 lbs.

Best Value at 1695.00

AARON MACHINERY CO., INC.

Dept. M • 45 Crosby St., New York 12, N. Y.

Walker 5-8300

Branches at: Buffalo, N.Y. • Mineola, N.Y.

**DEALER
INQUIRIES INVITED**

EXCLUSIVE DISTRIBUTORS IN THE UNITED STATES AND CANADA

at HAMILTON MFG. CO.
Two Rivers, Wis.



Home laundry clothes dryer



Examining room equipment



Steel laboratory equipment

Accurate high production, at low cost, is maintained by a battery of Cincinnati Shears—in the manufacture of Hamilton automatic washers and dryers, hospital and laboratory equipment.

These money making Cincinnati features have brought results—

- Durable All-Steel Interlocked construction.
- Automatic Pressure Lubrication.
- Accurate Back Gauge.
- Powerful Hydraulic Holddowns.
- Inclined Ram.

Cincinnati Shears accurately cut various thicknesses of material, without a change in knife clearance—this is a profitable time saver.

*Photos courtesy the Hamilton Mfg. Company,
Two Rivers, Wisconsin.*

New front controlled power back gauges are now standard on ALL CINCINNATI SHEARS.

Investigate these modern money making tools. Write for Catalog 8-7.

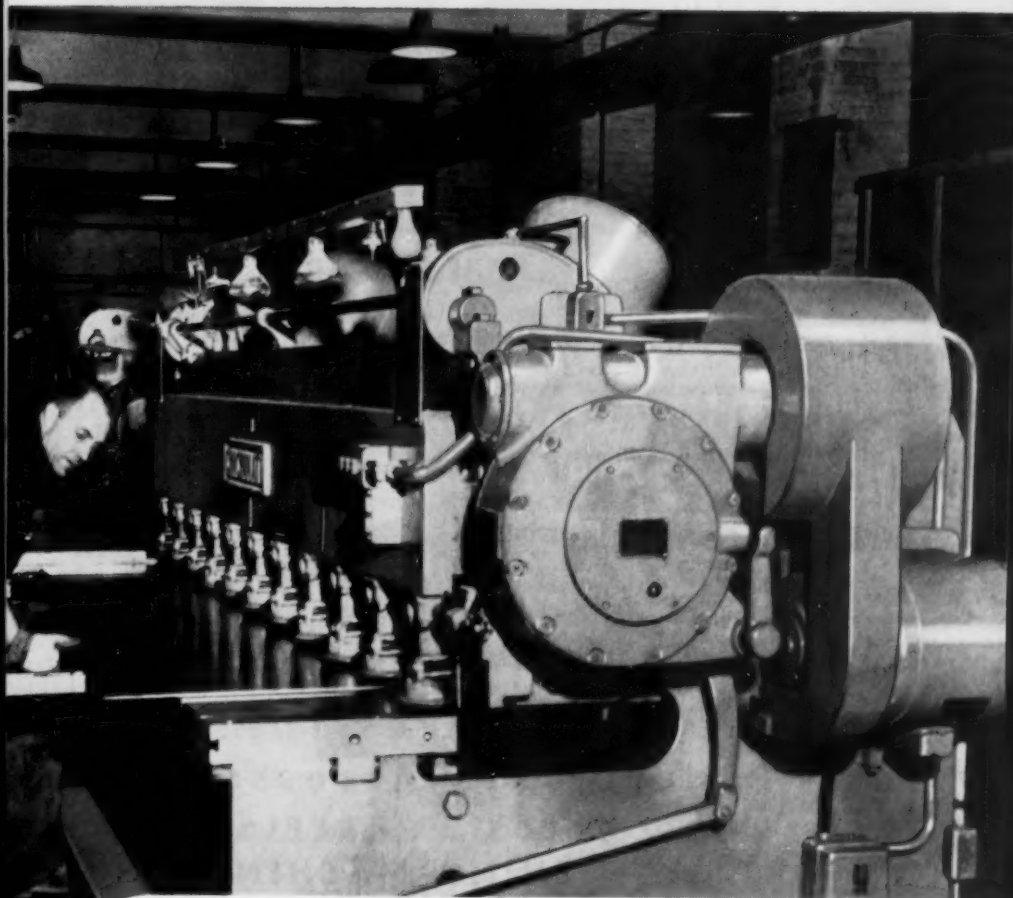


**DEALER
INQUIRIES INVITED**

Dept. M - 45 Crosby St., New York 12, N. Y.
Walker 5-8300
Branches at: Buffalo, N.Y. - Mineola, N.Y.

EXCLUSIVE DISTRIBUTORS IN THE UNITED STATES AND CANADA

**...25,000,000 lbs. of steel
sheared by cost cutting
CINCINNATI SHEARS**



THE CINCINNATI SHAPER CO.

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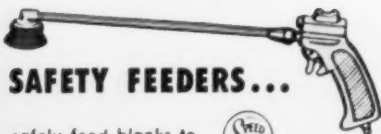
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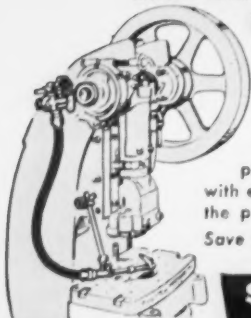
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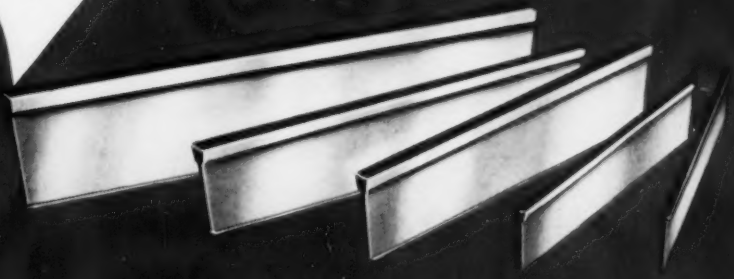
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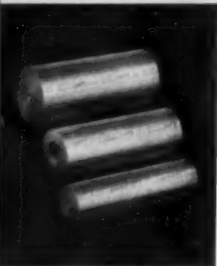
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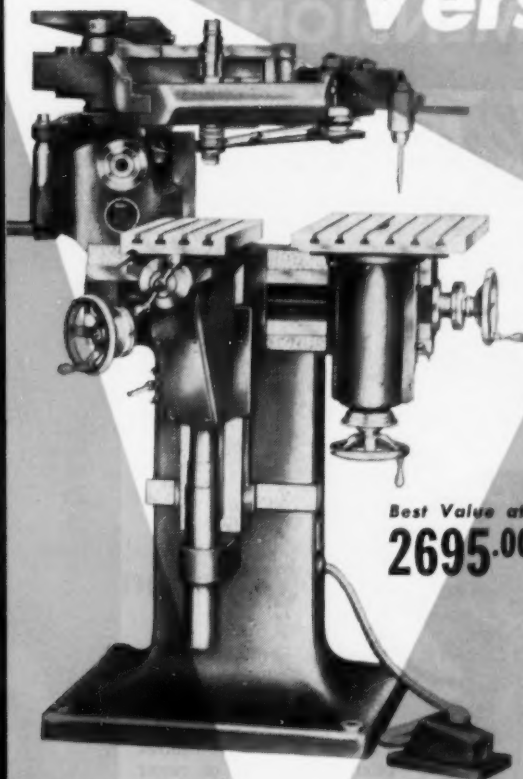
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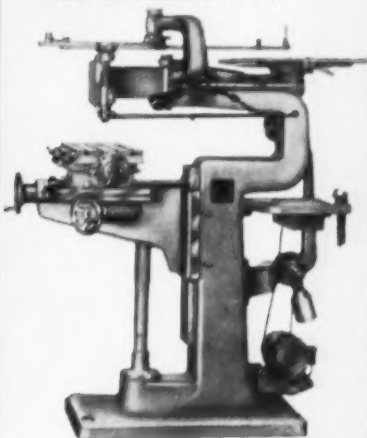
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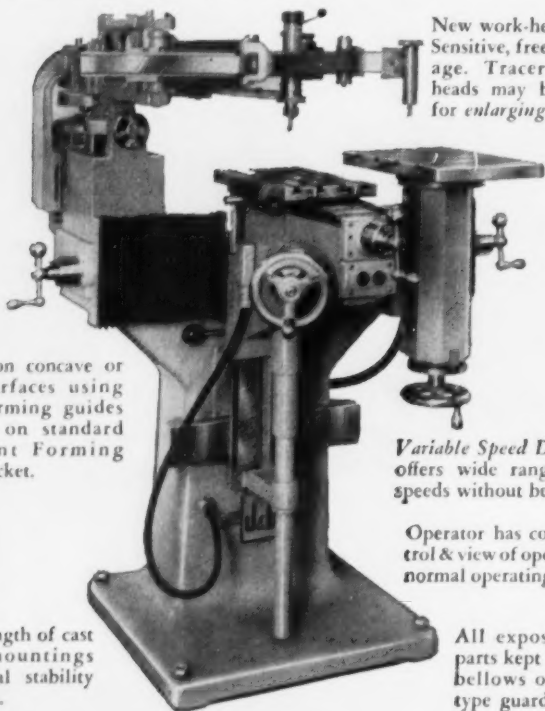
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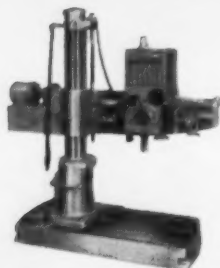
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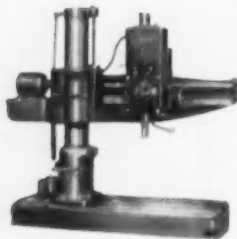
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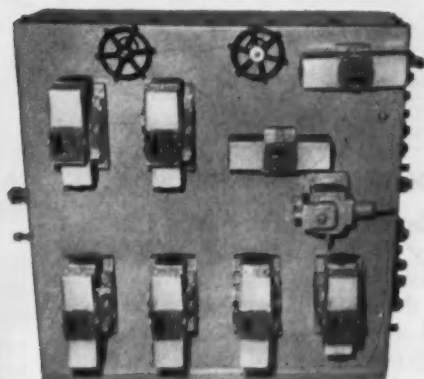
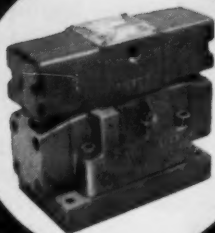
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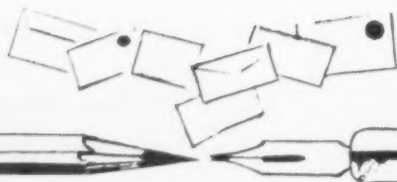
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OVER THE EDITOR'S DESK . . .



FRONTIERS AND FORECASTS

Rather astounding is the fact that fully 80 per cent of the one billion dollars worth of business which RCA did during 1955 came from products and services which were not on the market just ten years ago. This situation has prompted one RCA executive to remark that 80 per cent of the business done in electronics ten years hence will again be in things that have yet to reach the market. Such a situation would also lead one to be skeptical of any business forecast which is based largely on the old basic industries like steel and automobiles.

★ ★ ★

TOOL POOL

Aside from major programs of group insurance, pensions and the like, there are a lot of "little things" which a company can promote and which, despite their relatively low cost, can pay big dividends in the form of increased employee effort and cooperation. One such activity is a tool pool.

It is realized that many power tools and special hand tools are beyond the budget of the average em-

ployee. In the tool pool, an employee can sign out for tools for overnight or weekend personal use. One company in the east provides for a section of its machine shop to be left open one night a week, with supervision, to make heavy stationary power equipment available for worker's personal use . . . but not for sideline business.

★ ★ ★

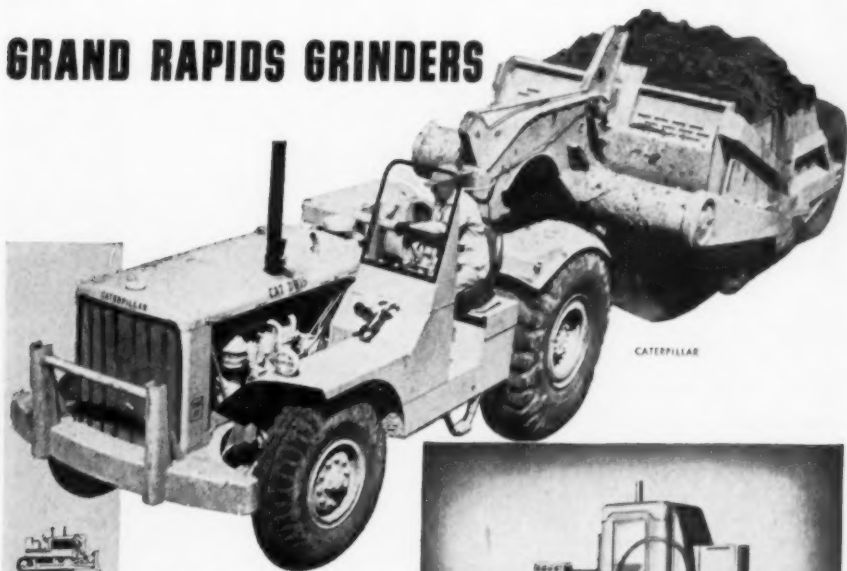
FAVORABLE RESPONSE

New orders for machine tools which ranged between 60 and 65 million dollars in the months preceding the big Show last September suddenly jumped to more than 103 million in the month of October, representing the highest volume of any month since July 1952. Louis Polk, President of the Sheffield Corporation and President of the National Machine Tool Builders' Association, attributes the increased volume to advances and improvements displayed at the Show as well as delayed buying by purchasers who wanted to take advantage of latest developments. Mr. Polk has pointed out that many replacement programs

(Continued on Page 103.)

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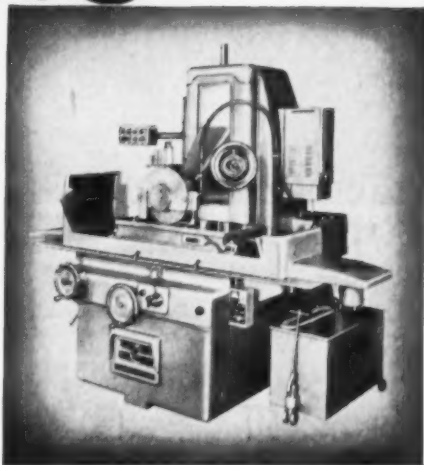
P. G. LA-TOURNEAU



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(Continued from Page 100.)

planned for this year are still in the making and that it is a bit early to say whether the October upsurge in new orders indicates a long term trend. With an actual excess of production capacity at present, the machine tool industry remains in an excellent position to readily supply the present demand for new tools and equipment.

★ ★ ★

1500

The figure 1500 took on added significance for American industry and government last month when it was announced by the American Standards Association that the 1500th American Standard had just been approved. This is double the number of American Standards in national use in 1948 and many of those have been revised, some several times. The 1500th is the American Standard Specification for Nickel-Chromium-Iron Alloy Seamless Pipe and Tubing.

★ ★ ★

THE NEW JOBS

With Automation, there'll be a continued demand for tremendous numbers of highly skilled men, to program computers as well as to build and maintain them. Even with the most completely automatized factory, we'll still need engineers, electronics experts, electricians, mechanics, pipe fitters, tool makers. We'll need more salesmen to dispose of the added output. Most of all, we'll need managers and creators

who can take advantage of the promised efficiencies of automation.

Under these conditions, our educational system faces an unprecedented challenge. With change all around us, it is no longer enough to train tomorrow's workers for today's jobs. The jobs may very well have vanished by the time the trainees get out of school. Yet we don't know precisely what the new jobs will be.

In this uncertain technological future, the odds are against a man with a narrow, pinpointed training. The best, most flexible training a youngster can have is a good grounding in fundamentals, particularly mathematics and sciences. Vocationally, that gives him room to take advantage of the specialized jobs that develop. In a world of increasing leisure, too, the humanities are important, teaching people to get more out of life and to be better citizens. Clearly, inadequate preparation could be just as big a contributor to future unemployment as the new machines could be.

★ ★ ★

LABOR PEACE

Last year was a year of labor peace. According to the Labor Department, strike idleness during the first eight months amounted to about $\frac{1}{4}$ of 1 per cent of all working time. In the years since the end of World War II, only in 1951 was a smaller percentage of total working time lost due to strikes. Although time lost was slight, percentagewise, it nevertheless figured out as 17.4 million days lost by 2,190,000 workers in 2,950 stoppages.

FEATURES IN T

CLAMPING ON THE TANGENT

By Fred Rogers

Applications of a wide variety of devices, designed for the purpose of clamping tubular components, are clearly discussed in this presentation. The author supplements his text with a large number of sketches of tangent clamping devices that comprise such elements as clamping bushings, plugs, collars and shoes. Page 106.

HOW TO FABRICATE WELDED STEEL TUBING

By W. E. McFee

The concluding part of this series deals with methods for joining welded steel tubing, as well as for cleaning and finishing same. Copies of the three preceding installments of the article are available upon request to this magazine. Page 118.

STOP THOSE SHOP ACCIDENTS!

By Paul Lockwood

This article presents a round-up of ideas, that have been used in various machine shop safety programs, to stimulate employee interest in such programs. Seven specific ways to reduce shop accidents are covered, with cartoon type illustrations supplementing the text. Page 124.

HOW TO MAKE AND REPAIR EPOXY DIES

By Norbert E. Talbert

A step-by-step procedure is outlined for making and repairing dies, made of epoxy resin. The advantages of these dies, in performing a wide variety of metalworking operations, are clearly illustrated and described. Page 128.



JANUARY

1956

N THIS ISSUE

GEAR PRODUCTION SIMPLIFIED WITH EXPANDING MANDRELS

Sundstrand Machine Tool Company, Rockford, Illinois, utilizes precision expanding mandrels, made by Scully-Jones and Company of Chicago, to simplify the production of gears for standard and special machines. Page 134.

FLOTURNING JET ENGINE PARTS

By Robert I. Shore

The discussion points out how engineers at the Ford Aircraft Engine Division, Chicago, have adapted Floturning—the cold flowing of metal to a specific shape over a hardened arbor—to the forming of critical parts for jet engines. Page 136.

MASS PRODUCTION DRILLING OF UNIVERSAL JOINTS

This case history points out how ingenuity on a multiple-hole mass production drilling job has saved a Maine manufacturer \$26,000 in original equipment costs and effected labor savings of over three times the cost of the equipment, that was purchased to do the job. Page 144.

GERMAN MACHINE TOOL EXHIBITION

Brief descriptions of the tools and equipment, displayed at the exhibition held last September in Hanover, Germany, are presented. Page 148.

AUTOMATION IN INDUSTRY

By Jacob J. Jaeger

This article contains the concluding remarks from a talk given before the New England Conference, American Society for Quality Control. Page 158.

VOL. 28

NO. 8



Clamping on the

Tangent

Applications of devices designed for clamping tubular parts are illustrated and discussed.

By FRED ROGERS

Someone once said, "If you really want to clamp efficiently, clamp on the tangent. Sawing a slot in a casting weakens it and clamping toward the center is for light work only." Apparently this statement, at least the first part, has struck a responsive chord in the thinking of some mechanically minded men, as it is quite easy to find a wide variety of tangent clamping devices in use today. These clamping devices take various forms, as will be clearly illustrated in this particular article.

Tangent clamping devices may be applied to the clamping of sleeves, quills and other tubular components. They may be used in jig and fixture work or to hold boring bars and turret tool shanks. Jacks, stop pins, gages and screws are adaptable to this form of clamping.

The clamping elements themselves are referred to variously as clamping bushings, plungers, plugs, collars and shoes. Some call them wedge, concave or tangent clamps. Others designate them as binder

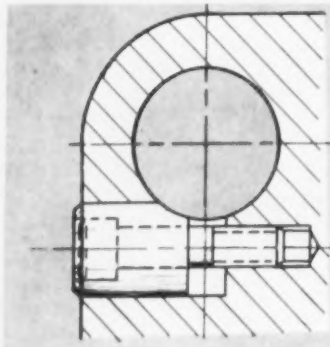


Fig. 1—In the application shown in this sketch, a single clamp is utilized.

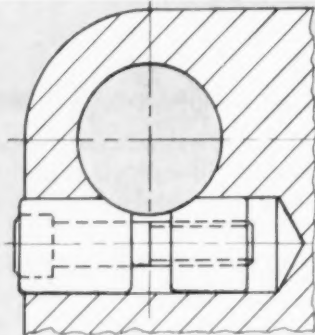


Fig. 2—For a tighter grip, two clamps are employed, as shown in the sketch herewith.

"... the clamping surface should be made as smooth as possible so as not to mar ..."

pads, lock bushings or floating plugs. Additional forms of such clamps include binder, wedge, clamping and pad bolts and studs. However, in this article they shall be known simply as clamps and clamp bolts. The clamp has either a body size screw hole, and counterbore if required, or a tapped hole, both for the clamping screw or stud used in the assembly. These devices are used either singly or doubly as desired or required. In the clamp bolt, the clamp and screw are integral, allowing the bolt to be used with a clamp as referred to above.

In the application illustrated in Fig. 1, a single clamp is used. To make it easy to grasp the proportions, the held member is $1\frac{7}{8}$ inches in diameter and the clamp is $1\frac{1}{8}$ inches in diameter. The center distance between the two is $1\frac{1}{4}$ inches. A $\frac{1}{2}$ -inch screw is used. The hole for the clamp is reamed $\frac{1}{4}$ inch past

the vertical center line. If the clamp is made on a production basis, it may be held in a fixture and the clamping surface milled with a side-cutting end mill of the same diameter as the piece to be clamped. However, if only a few pieces are made without the use of a fixture, the notch can be rough milled and then touched or trued up with a reamer when the clamp is in place. The clamping screw—in this case of the socket head cap type—can be used as the feeding element. The clamping screw threads into the metal surrounding the held member. In cast iron, the length of thread engagement should be approximately $1\frac{1}{2}$ times the screw diameter. The clamp can be made of mild steel, preferably centerless ground to a free sliding fit. It may or may not be heat treated as desired. In any event, the clamping surface should be made as smooth as possible so as not to mar

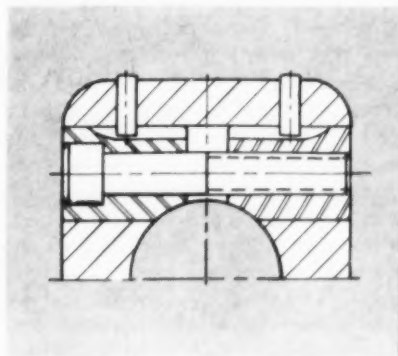


Fig. 3—To keep notches in alignment, clamps can be keywayed for two straight pins.

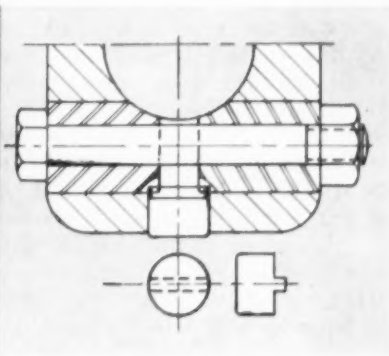


Fig. 4—In this design, both clamps are exactly the same — each with a plain hole.

"If a greater clamping area is desired, the distance between the clamps can be reduced . . ."

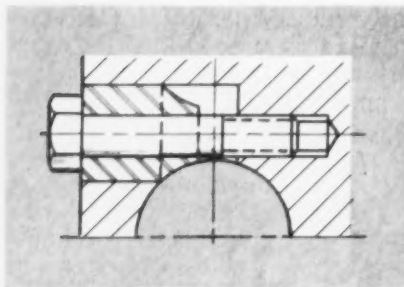


Fig. 5—The contact surface of this clamp was turned smoothly with a forming tool.

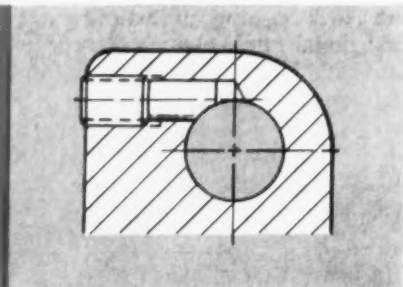


Fig. 6—Axis of clamp is tangent to held member; center of contact area is at angle.

the particular surface that is being clamped.

For a tighter grip, two clamps may be used, as shown in Fig. 2. The hole is reamed deeper to accommodate the threaded member. When milling in a fixture, each clamp pin is notched simultaneously. If a greater clamping area is desired, the distance between the clamps can be reduced from the $\frac{1}{2}$ inch shown to as little as $\frac{1}{8}$ inch. Sometimes clamps of this type will get out of line if the shaft or sleeve is once withdrawn and then reassembled. To keep the notches in proper alignment, the clamps can be keywayed for two straight pins, as shown in Fig. 3. The keyways should not be cut the entire length of the clamps for reasons of cleanliness. Where chips, coolant or oil are present, such materials could work in along the keyways and foul up the holes not only for the clamps but also for the shaft. On the other hand, these slots should not be of the closed end

variety, cut with an end mill at the center of the length of each slot and with taper pins engaging the slots. While this makes for a very clean arrangement, nevertheless the pins must be drilled out if the clamps have to be replaced. However, if the clamps are naturally in a vertical position, there might be some justification for blind keyways and taper pins. The clamps shown in Fig. 3 must be assembled from either end.

In most clamp pair designs, the two pieces are different — one is counterbored and drilled and the other is tapped, as shown in Figs. 2 and 3. Sometimes they are not the same length. In Fig. 4, however, both clamps are exactly the same—each with a plain hole. A hexagonal head screw and nut are used to pull the clamps together. Each clamp is notched at the lower side for the pin key shown below the main sketch. In this application as in the previous example, the clamps are assembled from both sides.

"... such a shape would provide but a single line contact instead of surface contact."

To eliminate end milling of the circular notch on the clamp in the manner shown in Fig. 1, the clamp illustrated in Fig. 5 has been tried. The clamping contact surface was turned smoothly with a forming tool. It was realized that such a shape would provide but a single line contact instead of surface contact. A clamp of this design will not hold as well as those clamps shown in Figs. 1 through 4. Unit pressure will be found to be considerably higher. It was decided to recommend this type of clamp for light work only. However, the use of the design shown in Fig. 5 would eliminate guide pins or keys.

A small, simple clamp is shown in Fig. 6. The axis of the clamp is tangent to the held member and the center of the contact area on the

clamp is at an angle of approximately 45 degrees. A socket set screw is used. This design is not as efficient as those illustrated heretofore. However, the center distance between the two holes can be increased to obtain a better contact angle. The particular design shown is for tight quarters or where operating space is at a premium.

In Fig. 7, a plain stud, threaded at both ends, is screwed into the hole of the casting and jammed at the drill point so that it cannot turn. A lever handle is used to tighten the clamp. A variation of this design can be obtained by either pinning or welding a rod to the handle which is threaded only at the lower end. The stud does not bottom in the threaded hole in the casting but rather serves as an ordinary screw.

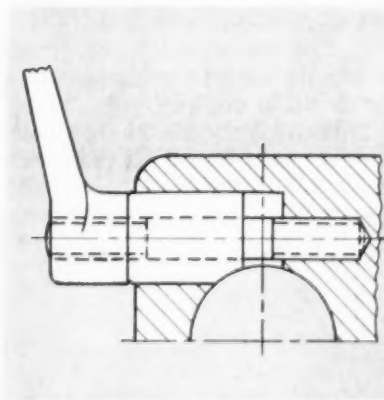


Fig. 7—A plain stud threaded at both ends is screwed into hole of casting and jammed.

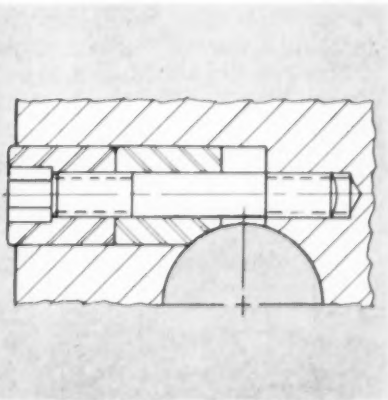


Fig. 8—A stud is screwed into casting, which is forced against last thread on stud.

"The smaller the angle, the greater the holding power becomes . . ."

In Fig. 8 a stud is screwed into the casting, which is forced against the last thread on the stud. A cylindrical nut, the same diameter as the clamp, is used to tighten the clamp against the held member. The upper end of the nut is broached to accommodate a hexagonal wrench such as used for socket head cap screws. This wrench takes the place of the lever handle suggested in the preceding design. This design provides for a flush appearance.

In all of the foregoing examples, the clamp was circular milled or notched to provide a clamping surface. In order to eliminate this form milling, an angular flat can be milled on the clamp, as shown in Fig. 9. This angle may be anywhere between 15 and 30 degrees and will determine the point of tangency or where the clamp contacts the held component. The shape of the clamping surface is shown in Fig. 10. The clamping action of the unit shown in Fig. 9 is illustrated in exaggeration in Fig. 11. The clamp at the right contacts the shaft at A and forces it downward against the bot-

tom of the hole. The clearance might be only several thousandths of an inch. The clamp at the left is shown in the tightened position. The smaller the angle, the greater the holding power becomes, but the more difficult it is to release the clamp.

A construction layout of the angularly milled clamp is depicted in Fig. 12, which shows how the length of clamping surface may be determined. The angle is $22\frac{1}{2}$ degrees and the diameter of the retained member is 3 inches. The diameter of the clamp is $1\frac{1}{8}$ inches. In laying out such a clamp, it is sufficient for the screw to clear the diameter of hole as shown in the end view at the right, which also shows the width of the flat. However, this is not the length of contact. By dividing the distance from the outside to the flat into four spaces and projecting the various points both upward and to the left, the length of contact, X, at the point of tangency can be determined. The developing lines are shown in dot and dash.

This angularly milled clamp also can get out of register if the retain-

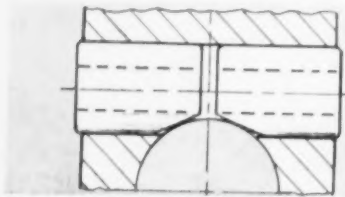


Fig. 9—An angular flat is milled on the particular clamp shown in this sketch.

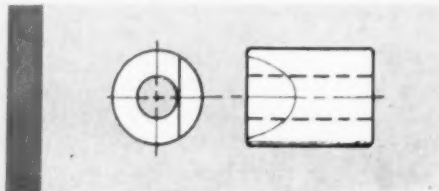


Fig. 10—The shape of the clamping surface of the design in Fig. 9 is shown here.

"... friction tends to prevent clamp rotation ..."

ed member is withdrawn and reassembled. To overcome this difficulty, a groove may be turned in the periphery of each clamping member, as shown in Fig. 13. A synthetic rubber O-ring is snapped into the groove and contacts the wall of the hole with the ring under slight pressure. The friction thus produced tends to prevent clamp rotation but will not affect endwise or clamping motion.

To eliminate the problem of register, a clamp with a turned conical surface was tried, as illustrated in Fig. 14. Whereas in the circular surfaced clamp (Fig. 5) line contact resulted, in the conical surfaced clamp there was theoretically but point contact. Unit pressure is even higher than with the clamp shown in Fig. 5. In this case also, it was decided to use the device for light clamping only.

Adjusting screws and other forms of threaded shafts may be clamped or braked to retard rotation. The clamps in Fig. 15 are made of hard bronze. If designed like the one shown at the right of the center line, the angular flat merely contacts the crests of the threads. After numerous clampings, ridges are formed in the clamping surface through the pressure exerted. The deeper these ridges, the better the screw is held. Sometimes these ridges are machined in purposely to the full depth of thread as shown in the design to the left of the center line. If the adjusting nut for the screw has been tapped rather than chased, then the

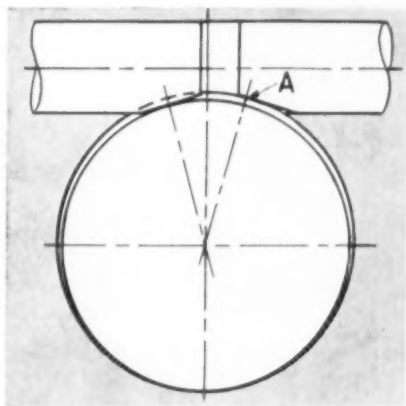


Fig. 11—Clamping action of unit in Fig. 9 is shown in exaggeration in this sketch.

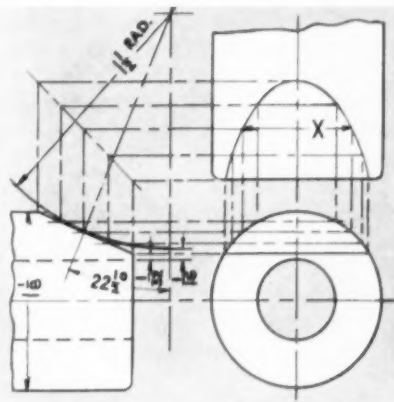


Fig. 12—Construction layout of the angularly milled clamp is provided in this sketch.

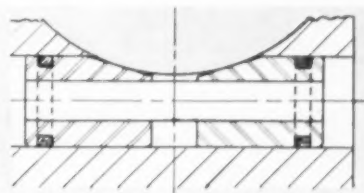


Fig. 13—To maintain register, a groove is turned in periphery of each clamping member.

"Sometimes another angle is introduced to provide additional holding power."

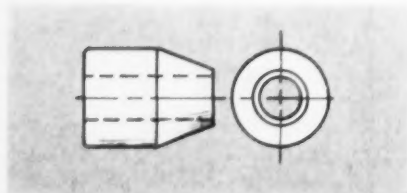


Fig. 14—The clamp shown in this particular sketch has a turned conical surface.

available tap can be used to cut the threads in the clamping surfaces, using the clamping screw as a feed screw. The angle used in this example is 30 degrees and a cross-section of the clamp shown along the line X-X is shown in Fig. 16. The threads will be full depth along this particular line.

Sometimes another angle is introduced to provide additional holding power. Two devices with such an angle are shown in Figs. 17 and 18. The device in Fig. 17 is a work support jack as applied to a fixture. The extra angle, designed as X in the view

at the left, is $7\frac{1}{2}$ degrees. In the right-hand view, instead of gripping on the periphery of the held member as in all of the other designs, the held member is cut at a 30-degree angle each side of center and at a $7\frac{1}{2}$ -degree angle the other way. Once the member is clamped, the greater the pressure in the direction of the arrow, the tighter it will hold.

In the design shown in Fig. 18 a double wedging action takes place. In the lower view, the clamp is milled off at a slight angle and is drawn tight with a French head machine screw. In the upper view, the pin is cut with a small angular flat and is adjustable from above by a headless screw. Actually the clamp locks the screw and vice versa.

In all of the foregoing clamp designs, some type of screw or stud was used as the tightening medium. In the bolt style clamp, the clamp and screw are integral. This type of clamp is usually tightened with the aid of a hexagonal nut. The simplest

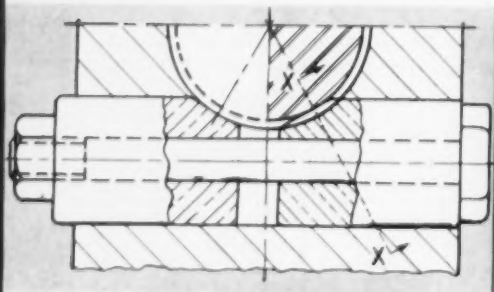


Fig. 15—The clamps illustrated in this sketch are made of hard bronze material.



Fig. 16—A cross section along line X-X of clamp depicted in Fig. 15 is shown here.

"Springs . . . are used to regulate pressure . . ."

of bolt style clamps is shown in Fig. 19. The bolt is circular notched to conform to the diameter of the held member. After the cutter has been fed to the proper depth, it is moved transversely about 1/16 inch to extend the slot so that clamping takes place to the right of the center line. Because of wedging action it will sometimes be necessary after unclamping the device to hit the nut end of the bolt with a babbitt hammer to release it.

The bolt shown in Fig. 20 is similar to the one shown in Fig. 19 except that it is two-diameter and larger. The screw end accommodates a lever handle. The manner of cutting the clamping notch is the same as described above. In the design in Fig. 21, the clamping portion of the bolt is larger than in the designs shown in Figs. 19 and 20. The notch is cut in the manner explained at the beginning of this article. The clamping surface is considerably smaller than in the two foregoing examples. For a double clamp effect, a regular clamp is used in conjunction with the bolt, as shown in Fig. 22. This design, it will be readily apparent, is similar to that shown in Fig. 2 but tapping and a screw are eliminated. However, a nut has been added.

Multiple clamping may be accomplished with the bolt style of clamp. The clamps shown in Figs. 23 and 24 are designed to clamp two pieces but otherwise are very similar to those shown in Figs. 21 and 22. Figure 25 shows a design whereby

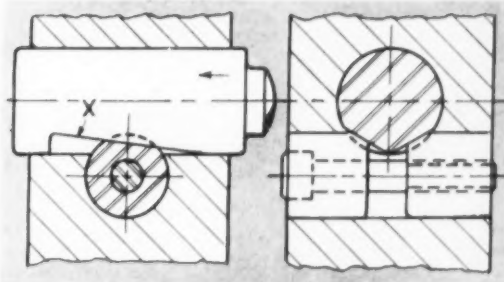


Fig. 17—This sketch shows a work support jack as applied to a holding fixture.

four pieces are held. The lower ends of the two double notched bolts A-A are cut off at a slight angle. These ends contact two clamps actuated by a long flange-headed screw. A socket screw wrench is used to tighten the screw.

Springs are also used in conjunction with clamps and clamp bolts. They are used to either regulate the amount of pressure with which the retained member is held or they are used to automatically force the two

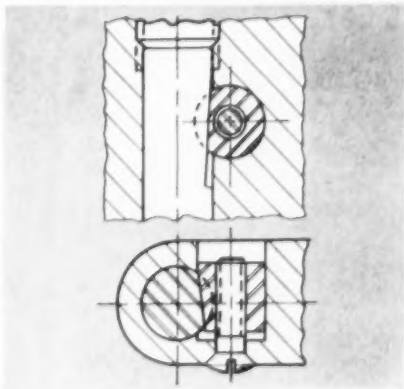


Fig. 18—In this design of clamping device, a double wedging action takes place.

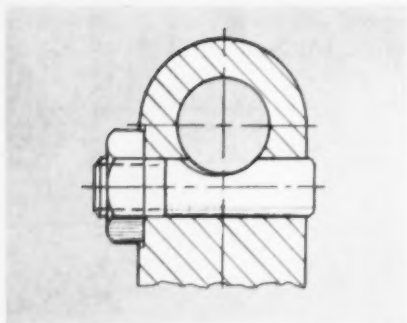


Fig. 19—In this clamp, the bolt is circular notched to conform to diameter of part.

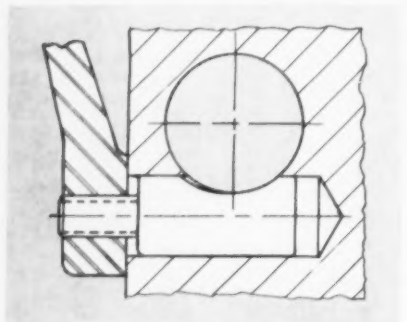


Fig. 20—The clamp bolt here is similar to one in Fig. 19 but two-diameter and larger.

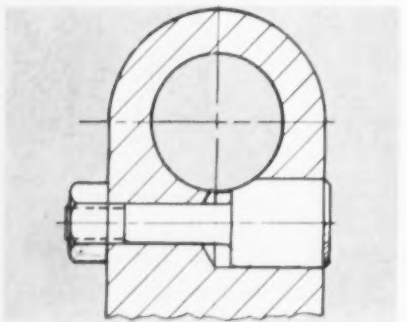


Fig. 21—In this design, the clamping portion of the bolt is larger than in the designs illustrated in Figures 19 and 20.

"... clamp and bolt are forced apart when loosened."

pieces apart when unclamping takes place. In the design shown in Fig. 26, two actions occur. Because of the 1/16-inch play at the clamping notch, ordinarily when the screw or nut is loosened, the piece to be retained or clamped has an opportunity to move laterally in the hole. In this application, the spring presses the clamp against the piece with predetermined pressure so that there is no movement of the held piece. When solid clamping takes place, the thumbscrew, bottoming in the drill point of the hole, forces the clamp in the same direction as the spring does. So that there will not be too many threads in contact, the clamp is counterbored slightly larger than the screw diameter to the depth shown.

In the design shown in Fig. 27, the clamp and bolt are forced apart when loosened. Sticking occurs

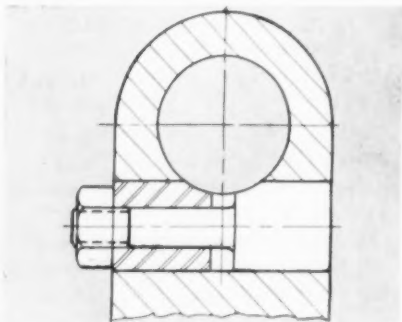


Fig. 22—For a double clamp effect, a regular clamp is used in conjunction with the bolt that is shown in this sketch.

"... recess will prevent buckling of springs ..."

sometimes, so instead of relying upon jolting the clamp and bolt with a hammer, two springs are used. Holes are drilled into the clamp and the bolt is recessed all around the shank to seat the springs as shown. The use of this recess will prevent possible buckling of the springs, at least in an outward direction. If the groove is not desired, then short holes can be drilled where the groove is shown.

A spring is the only means of providing clamping pressure in the design shown in Fig. 28. It must be calculated to exert the required pressure sufficient to hold. Paradoxically, the socket set screw is used to unclamp rather than clamp by compressing the spring. After the spring forces the clamp against the piece, the screw just barely touches the clamp so as not to have a loosening effect. This is the position of the

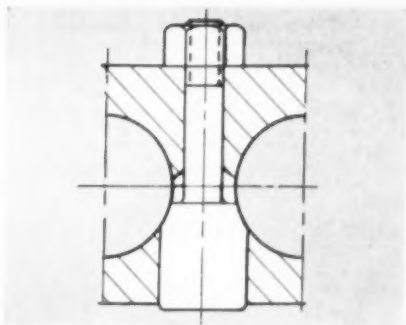


Fig. 23—Multiple clamping may be accomplished with bolt style of clamp shown.

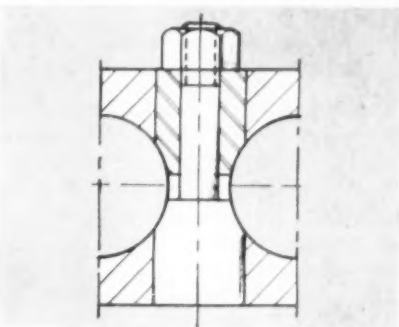


Fig. 24—Two pieces may be simultaneously clamped with the design shown herewith.

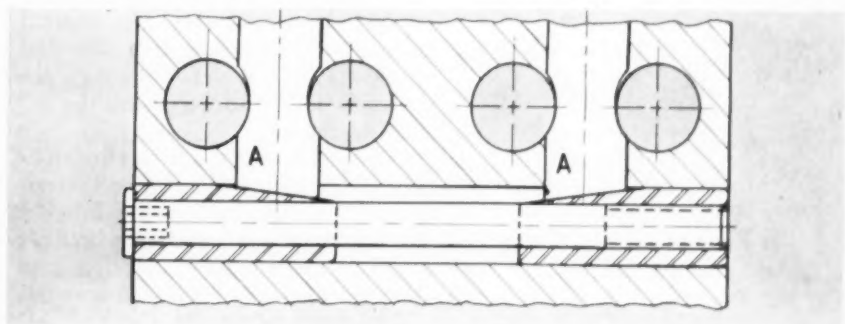


Fig. 25—This sketch shows a design for clamping four pieces. The lower ends of the two double notched bolts A-A are cut off at

a slight angle. These ends contact two clamps actuated by a long flange-headed screw. A wrench is used to tighten screw.

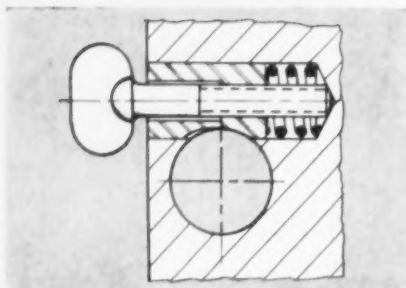


Fig. 26—Springs can also be used in conjunction with bolt style clamps shown.

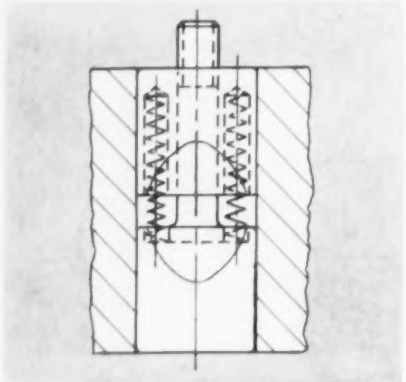


Fig. 27—In this design, the clamp and bolt are forced apart when they are loosened.

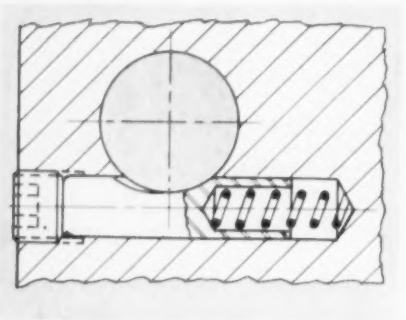


Fig. 28—A spring is the only means of providing clamping pressure in this design.

"... clamping forces can be varied ..."

clamp as shown in the sketch in Fig. 28.

When a large diameter clamp retains two members, as shown in Fig. 29, a heavy spring can be used centrally to provide for releasing of the members. The stud is forced home against the last thread in the counterbored hole. The clamp is also drilled out from the bottom to accommodate the spring. The upper end of the clamp is recessed to receive a washer.

In the design of clamp shown in Fig. 30, clamping forces can be varied on a tube-like workpiece. A spring is used to control the pressure that is exerted on the thin-wall component. A dog point set screw contacts the end of the clamp screw. A short set screw locks the former screw. The position of these screws in the lower clamp controls the pressure on the spring. The headed screw can be loosened to unclamp without fear of disturbing the setting of the adjusting screws. This headed screw is jammed against the dog point set screw when clamping takes place, with the spring doing the actual clamping.

Before leaving the subject of double clamping, other methods (not shown) are available to the designer for multiple-type holding with bolt style clamps. In one application, gear teeth in the form of pinions were cut on the heads of two clamping screws. A lever handle having a gear segment either side of center contacted these pinions. Movement, therefore,

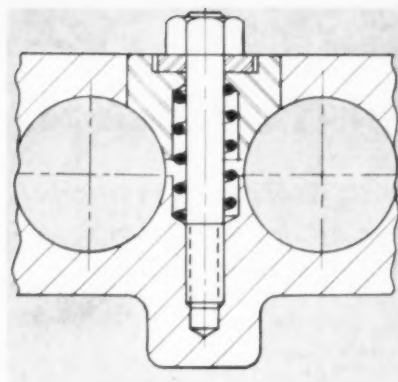


Fig. 29—When clamp retains two members, a spring can be used to release the members.

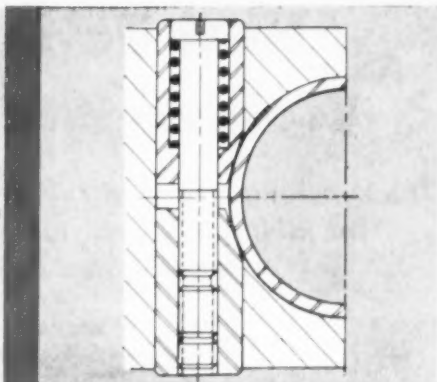


Fig. 30—In this design, clamping forces can be varied on a tube-like workpiece.

of a single lever tightened or loosened two clamping pins placed laterally along the retained member. In another arrangement where the clamps were far apart, a rack was used to connect the two pinions on the tightening screws of the clamps.

In Fig. 31, the body of the bolt is cut off at an angle. This angular surface contacts a flat which is milled on the periphery of the held member. The ends of the bolt are reduced and threaded for round flanged nuts

—one at either end. These nuts are tightened with a hexagon wrench ordinarily used with socket head cap and set screws. In Fig. 32, a tapered pin with threaded end is used as the clamping medium. The retained member is grooved to accommodate the tapered pin as shown in the two views. The hole for the tapered pin is reamed slightly larger than the pin diameter, and the pin bears against the top of the hole when the clamping action occurs.

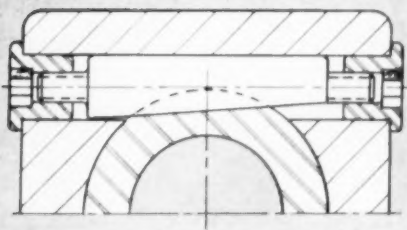


Fig. 31—The body of the bolt illustrated in this sketch is cut off at an angle.

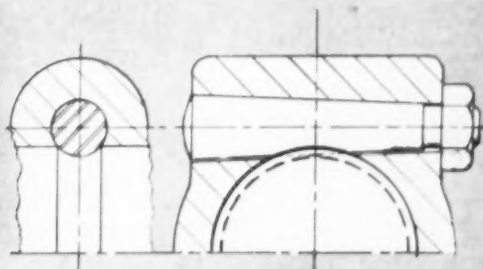


Fig. 32—In this design, a tapered pin with threaded end is used as clamping medium.

How to Fabricate Welded Steel Tubing

The concluding part of this series deals with methods for joining welded steel tubing as well as for cleaning and finishing same.

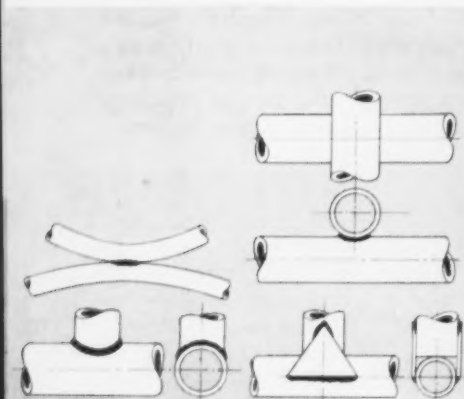
By **W. E. McFEE**
Supervisor, Product Information Service,
Armco Steel Corporation

Welded steel mechanical tubing can be readily joined by any of the common welding methods. Metal arc welding is recommended for the heavier gauges, such as 14 and 16. For wall thicknesses 20 gauge and lighter, oxyacetylene welding is preferred, because metal arc welding is rather difficult to con-

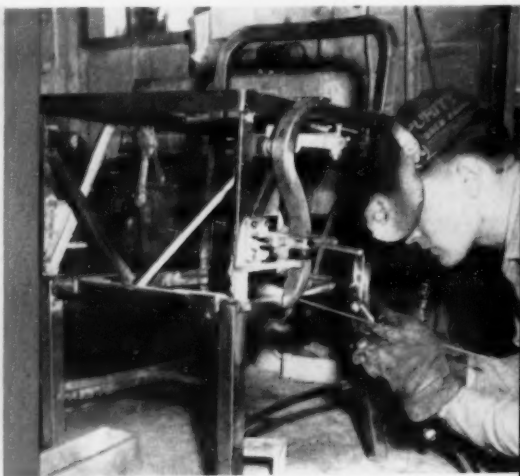
trol in these gauges and generates considerable heat, which may melt holes in the tubing.

BRAZING

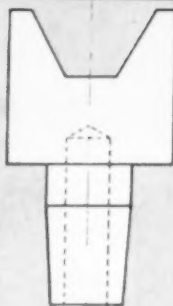
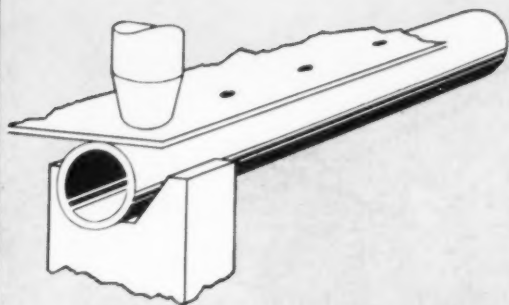
Brazed joints made with an oxyacetylene flame by skilled operators provide for high production with sound, strong joints. Use of the low-



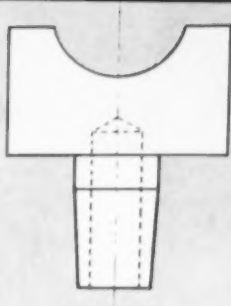
Group of seven sketches showing various weldments in tubing parts and assemblies.



Operator is shown tacking a chair frame with oxyacetylene flame and brazing rod.



Forked electrode



Shaped electrode

(Left to right) Conventional electrode, forked electrode, and shaped electrode.

er melting point brazing rod helps prevent burn-through. A process is available to introduce flux through the gas lines, thus eliminating dipping of brazing rod into flux paste.

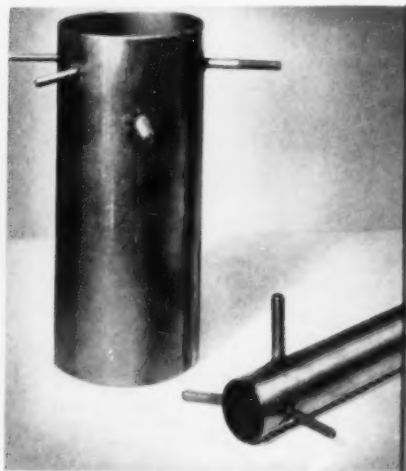
SPOT WELDING

Flat sheets or sheet forms can be readily spot welded to tubing. For such applications, a conventional spot welding electrode should be

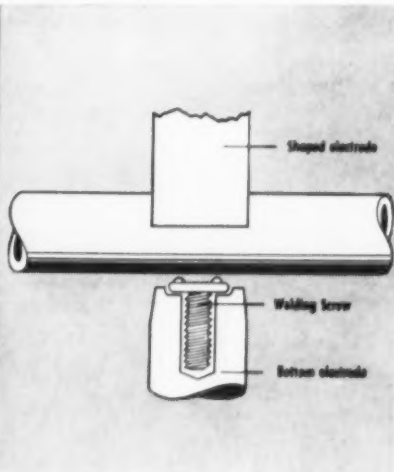
used on the sheet side and a shaped or forked electrode on the tubing.

STUD WELDING

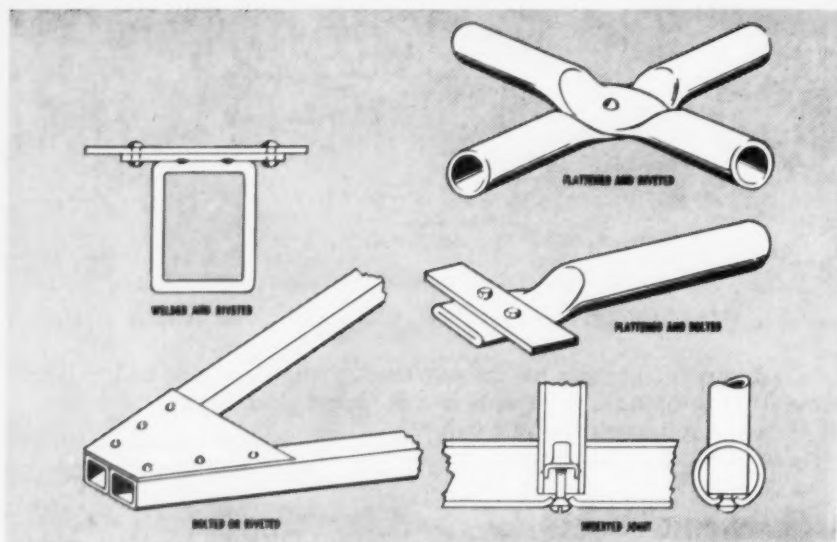
The electric arc stud welder works best on the heavier gauges of welded tubing, although it has been used on practically all wall thicknesses. It provides an efficient means for attaching male and female studs, eye-bolts, right angle bends, hook studs



Welded steel tubing to which studs have been attached by projection welding.



Sketch of setup for attaching studs to welded steel tubing by projection welding.

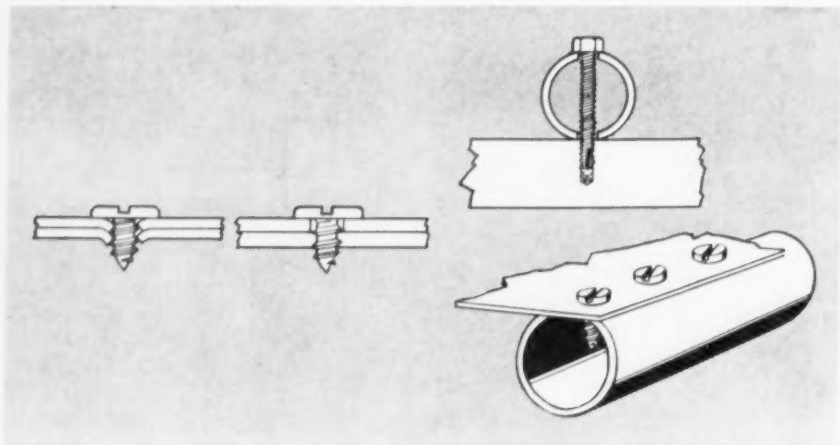


This illustration shows the more common methods of bolting and riveting welded tubing.

and special studs. The operation requires a special semi-automatic stud gun and control unit, an expendable porcelain ferrule to completely shield

the arc, and a flux-filled type stud.

Studs also can be attached to tubing by projection welding on regular spot welders. Studs with projec-



Thread-forming and self-tapping screws for fastening sheets to welded steel tubing.

tion lugs on the head should be used and the bottom electrode should be drilled for easy insertion of threaded section of stud. Welding insert nuts also can be obtained for projection welding. With them internally threaded connections can be made on walls too light for threading.

BOLTING AND RIVETING

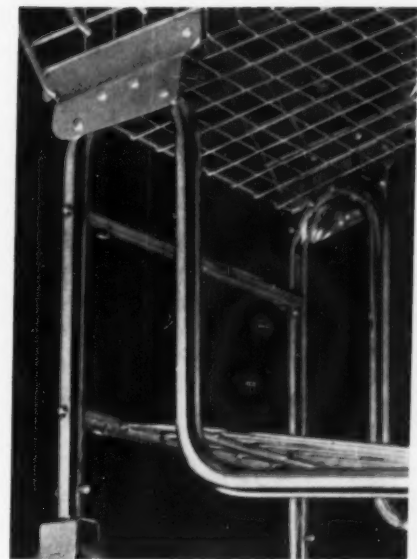
One of the accompanying illustrations contains several sketches showing the more common methods of bolting and riveting welded tubing.

SPECIAL FASTENERS

There is a wide variety of types and sizes of thread forming and sheet metal screws. The more common ones are stocked by jobbers; others are available from manufacturers.

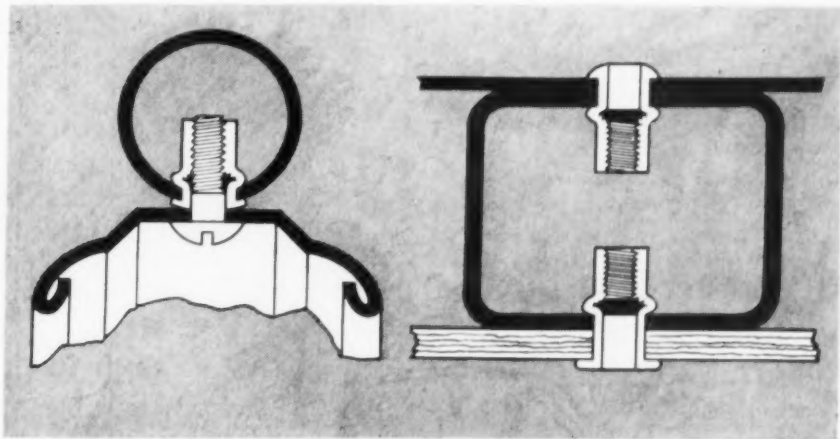
BLIND RIVETS

There are three well-known types of blind rivets that can cut assembly costs and improve quality of the work. One is the drive-pin type that



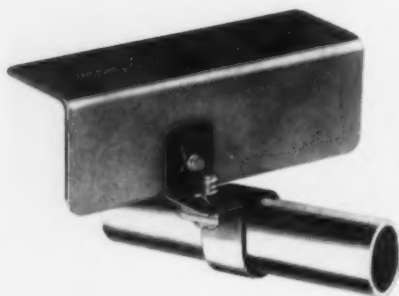
Welded tubing "Baskart" with lock bolts.

requires only a hammer blow. Hollow and self-plugging types are installed with the aid of special hand-operated or semi-automatic tools.



Drawing showing fastening applications of one-piece type blind rivets with threads.

"... another rivet is designed for blind or open uses."



Assembly made using angle bracket nut.

Another type is a one-piece blind rivet with threads. It comes with either an open or closed end in a limited range of sizes and is installed with hand or power tools.

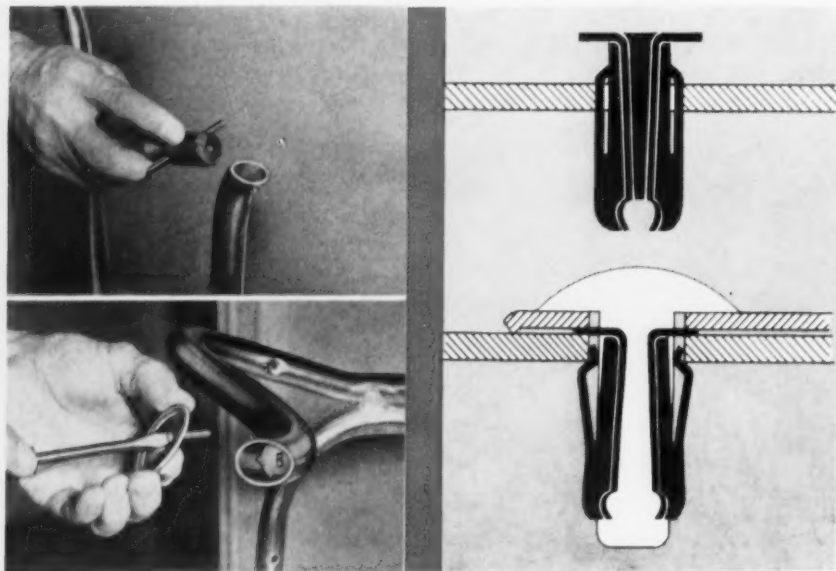
Still another rivet is designed for blind or open uses. Hand or semi-automatic tools pull a pin that sets the rivet. In the self-plugging type, the pin breaks off flush with the rivet head at the end of the operation.

CLIP FASTENERS AND FITTINGS

A few of the hundreds of different fittings and fasteners that can be used on tubing parts and assemblies are shown in several of the accompanying illustrations.

CLEANING

Oil, grease and dirt can be removed from tubing by hand-wiping

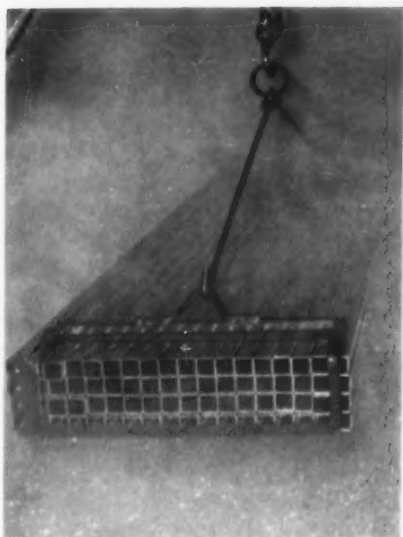


Special nuts used to attach glider plates. Clip fasteners used with unthreaded studs.

with naphtha or special solvents. If volume permits investment in cleaning equipment, alkali cleaning or vapor degreasing is most effective and economical. Cleaning before fabricating and between operations facilitates welding and brazing and makes for a better product. Grease and dirt must be completely removed before painting welded steel tubing.

FINISHING

Welded steel tubing is supplied in a cold-rolled finish well suited for high finishes in paint, baked enamel and synthetic lacquers. To remove tool marks, grinding and polishing wheels of the built-up glued type can be used or factory-coated abrasive strips of an appropriate grit.



Rack of tubing emerging from degreaser.



Polishing metal furniture parts on abrasive wheels before welding and finishing.

7

WAYS TO PROMOTE SAFETY
IN THE MACHINE SHOP

Those Shop Accidents!

A round-up of ideas used in various machine shop safety programs to stimulate employee interest in such programs.

By PAUL LOCKWOOD

Machine shop safety programs need plenty of variety to spark employee interest in an accident prevention attitude. Workers in the shop are apt to get lulled into a sense of false security unless something is done to stimulate interest in accident prevention. This article presents a round-up of ideas that have been used in various machine shop safety programs to stimulate employee interest in such programs.

1. SAFETY DRAWING

Taking a chance seems to be second-nature for most machine shop workers. This safety stimulator

takes the chance out of the work around the shop and puts it into a weekly safety drawing. All safety-minded employees in the machine shop participate in the drawing. One or more names or badge numbers are drawn each week. The lucky employees each receive a cash award—\$5, \$10, or \$25. Eligibility is based on accident-free work in the plant. Employees who are involved in a plant accident are not eligible to have their name drawn for two weeks after the date of the accident.

Another machine shop using this safety drawing stunt makes an entire department ineligible for a week if there is an accident in the depart-

ment. For instance, one accident of a worker in the finishing department makes all employees in the finishing department ineligible for that week. This builds a spirit of safety co-operation all over the machine shop and has proved very effective.

2. SALES DEMONSTRATION

Many machine shops have found that sales demonstrations of safety clothing are effective. A representative from a safety clothing manufacturer sets up a display in the machine shop. Employees buy on company time and get credit for safety clothing purchases through payroll deductions.

Machine shop executives who have held sales demonstrations in the shop have a few warnings. It is wise to look over the line of safety clothing before it is offered to the employees. This includes a check on the value and on the price of the clothing being demonstrated.



"All safety-minded employees in the machine shop participate in the drawing . . . the lucky employees each receive cash awards."

One machine shop safety director held a sales demonstration for safety shoes. The idea seemed to be going over and most of the workers in the shop were visiting the demonstration. A check on the sale demonstrator revealed that he was showing the safety shoes, but was doing a land office business for other types of shoes.

3. COMPANY PURCHASES

This safety stimulating idea is worked in cooperation with the machine shop's purchasing department. A list of approved safety clothing is prepared and distributed to all employees. A handy checklist order form is prepared and all employee orders are pooled for fast delivery and for more reasonable prices.

Even if the employee response is not overwhelming to this offer to purchase, there is a subtle safety reminder to everyone in the machine shop. They become safety conscious



"Many machine shops have found that sales demonstrations of safety clothing are effective . . . employees buy on company time."

"Prizes seem to stimulate interest in any program. Safety is no exception."

for a time after the printed lists are distributed.

4. SAFETY SHOW

One machine shop safety director hit on the idea of a safety show to stimulate interest in safety. This carried through in a fast moving approach to the whole problem of safety. The right and wrong ways of handling materials and machines were very effectively pointed out by employees who illustrated various types of workers in the machine shop.

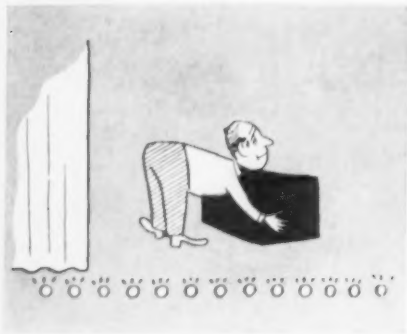
For instance, one of the drill press operators gave an illustration of the "Show Off" and did things that any member of the audience would not think of doing in the shop. The "Strong Man" was exemplified by a worker who demonstrated his great lifting power (the wrong way) and

was finally shown up by his ten year old son who lifted in the correct manner.

5. SAFETY SLOGAN

Prizes seem to stimulate interest in any program. Safety is no exception. One machine shop worked out a safety slogan contest. Everyone in the company was eligible to enter any number of slogans in each month's contest. Winners usually twisted a popular saying into a safety slogan. For instance, the "jive talk" expression, "Don't be a square," was used in a prize winning safety slogan, "Don't be a square—stick a round."

Even if the slogans submitted are not as good as the professionally prepared safety slogan, the effect is usually better. The winning slogan will catch on in the machine shop



"... a safety show to stimulate interest in safety illustrates the right and the wrong ways of handling materials and machines."



"One machine shop worked out a safety slogan contest ... winners usually twisted a popular saying into a safety slogan."

and among all the workers. Everyone will be using it because it was created by a fellow worker in the machine shop.

6. SHOWMANSHIP

Anything that can be done with a flourish to add a little showmanship to the safety program will act as a stimulant. A mechanical man that shows the strain on the back caused by improper lifting, for instance, is used by one machine shop to tell an old safety story in a new, memorable way.

To add showmanship to your safety program, you can take some annoying accident problem. First, find the cause of the problem and then dramatize it in an unusual manner. An easy way to do this is to translate the statistic into something that is easy to visualize . . . cost of lost time, for instance, could be readily translated into fishing equipment.

7. PERSONALIZED POSTERS

Safety posters are good safety-stimulators. Their value can be increased, however, if they are personalized to the machine shop and to the employees. Photos of accidents add a personal touch and tend to eliminate the thought, "It couldn't happen here to me."

One machine shop ran a series of photos of accident causes in the plant. There were no identifications of the location, and the poster asked this question, "Where is this?" Employees made guesses about the location of the unsafe conditions. They accused workers in other depart-



"Safety posters are good safety-stimulators. Their value can be increased, however, if they are personalized . . . to employees."

ments. They were more careful in their own work space. They were made safety conscious through this safety-stimulating idea and the accident rate took a dip in the shop.

★ ★ ★

Better Tool Cribbs. By William Raisglid. Published by The Industrial Press, 93 Worth St., New York 13, N. Y. 152 pages. Illustrated. Cloth binding. Price, \$4.00.

This book demonstrates that there is a way to avoid confusion and wasteful methods of conducting tool crib functions, and that production gains to be derived from a well-organized crib are great enough to demand close attention from all concerned with its operation. All of the information in this book is based on sound, experience-proven practice. By means of profusely illustrated descriptions, the author shows in detail how such items as milling cutters, honing units, counterbores, fly cutters, measuring tools, gages, machine parts and other shop tools and materials should be stored.

HOW TO MAKE AND REPAIR

Epoxy Dies

A step-by-step procedure for performing these operations is outlined.

By NORBERT E. TALBERT

Poly-Plastic Division,
REF Manufacturing Corporation

Making epoxy resin tools is a very simple procedure and keeping them in good repair is even simpler! Epoxy tools can be used for most operations which require steel or other metallic tools. For applications such as trimming, blanking, piercing, in short, where a shearing action is involved, steel tools are at this time still the best answer. How-

ever, when it comes to forming tools of any description the epoxies are in their element. The aircraft industry, for example, uses tons of epoxy resin to prepare massive stretch dies, drop hammer dies, and a host of forming dies for punch presses of practically any capacity.

The advantages are numerous. First, the epoxy dies require a mini-

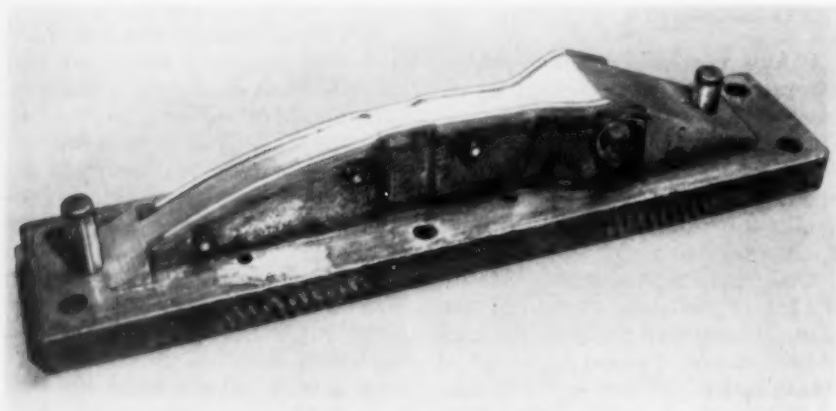


Fig. 1—This steel male die, which is coated with parting agent, is used as the pattern from which to subsequently prepare the mating epoxy resin female die.

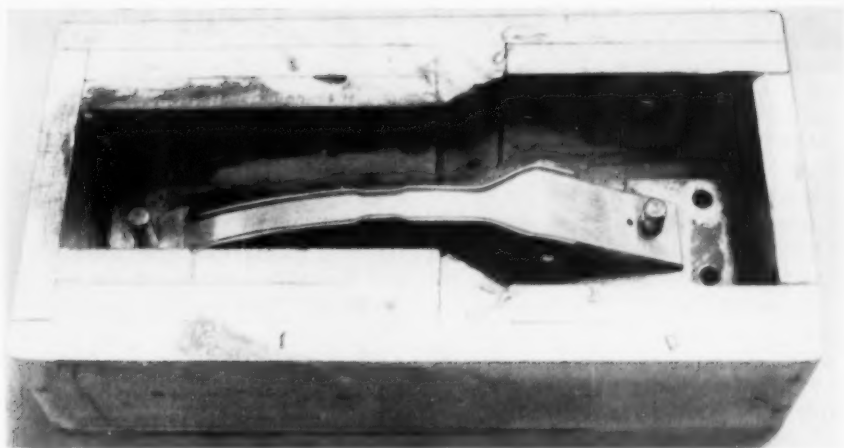


Fig. 2—A wooden box helps to confine the flow of the Epon resin formulation. Light area at back surface of box indicates the height to which plaster of Paris is packed.

mum of preparatory equipment. For example, no melting pots or other large heating facilities are needed. Second, epoxy dies are light in weight. They are frequently built hollow and even large units are often easily portable. Third, machining of

epoxy dies is almost nil, because the material is *cast* against a wooden or plaster master. All in all, the plastic dies are economical because they require a minimum of material and preparatory time.

Although we have only recently

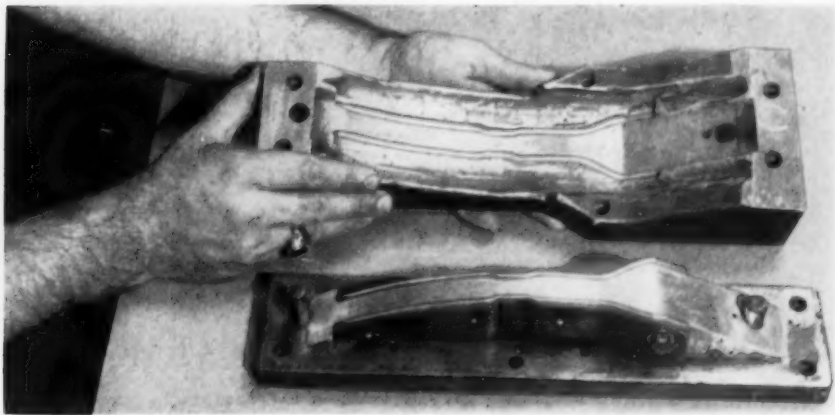


Fig. 3—On the work table is the steel male die. In the operator's hands is the plastic female die has been readied for mounting on the press.

"... we machined the male and used it as a master for casting the mating plastic female die."

started to use Epon* resins in our shop for die making, we can easily confirm the above-mentioned benefits accruing from the use of plastic tools. One stamping die alone, used to form stainless steel, has shown us that impressive savings are possible. Whereas a matched die set probably would have cost nearly \$750 to build, we cut this cost by better than thirty per cent because we machined only the male and then used it as a master for casting the mating plastic female die.

Step-By-Step Procedure

The male die shown in Fig. 1 was prepared by conventional toolroom

methods and placed into a snug fitting wooden box, as illustrated in Fig. 2. Enough plaster of Paris was then packed around the die to cover its vertical sides up to a point where the bolts on the sides of the die are no longer visible. This is done for two reasons; namely, (1) a minimum of resin is wasted this way, and (2) without this plaster protection, the poured resin would envelop the bolts and, after hardening, the male and female sections could not be separated. The height to which the plaster was packed is also shown by the light area on the inside of the

*Registered Trademark, Shell Chemical Corporation.

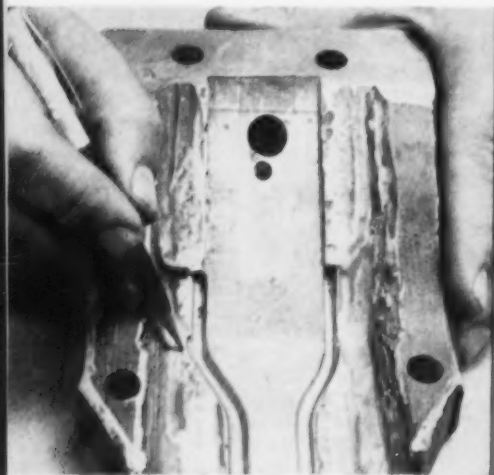


Fig. 4—After forming more than 2,500 pieces of 0.020-inch stainless steel, sharp edges begin to show excessive wear. However, the die is easily repaired for further use.

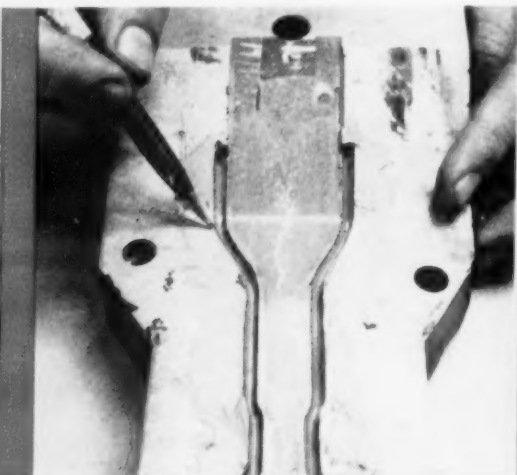


Fig. 5—Fresh Epon resin formulation has been cured to the old formulation, and the sharp edges thus produced on the die are said to make the die as good as new.

box in Fig. 2. All surfaces were sprayed with a parting agent.

Next, we prepared the plastic tooling formulation. Epon resin 828, supplied by Shell Chemical Corporation, was mixed at room temperature with curing agent Z and powdered aluminum in a ratio of 10:2:20. After being well stirred, this 60 per cent metal filled formulation was poured into the wooden box.

To cure the casting we placed it into an oven, where the temperature was held at 175 deg. F. for two hours. Another two hours at a higher temperature (300 deg. F.) followed to postcure the die and give it optimum impact strength and hardness. The completed tool, after it has been removed from the mold and a few holes have been drilled, is shown in Fig. 3.

Tough as these plastic tools are, they do wear. For example, after imparting 3/16-inch radii to more than 2,500 pieces of 0.020-inch stainless steel, our tool's edges were no longer as sharp as they should be. The pencil in Fig. 4 points to one area where the demands on the tool are particularly severe, as evidenced by the rounded corners. Fortunately, this die is easily repaired for further service.

To repair the tool we use the same formulation we used to make the tool originally. Sometimes, when we are pressed for time, we use curing agent U instead of curing agent Z, because the former permits a shorter cure. However, in that case we sacrifice some of the wear resistance and other physical properties attainable with curing agent Z.

The worn die is cleaned with 120-

grit emery paper and acetone to remove traces of oil or other substance which might interfere with a good bond. Fresh formulation is then brushed over the worn edges, and the steel male (coated with parting agent) is clamped to the female die. Any excess resin squeezed out is wiped off, and the assembly is then cured.

After curing, a repaired die looks like the one in Fig. 5, the pencil pointing to the sharp corners which now have been restored.

Although the cured formulation is surprisingly tough and impact resistant, it is nevertheless easily machinable. As shown in Fig. 6, small excesses of cured resin are filed off, and the die is as good as new. In fact, the two parts illustrated in Fig. 7 were formed on a 90-ton press, using the repaired epoxy-based die.

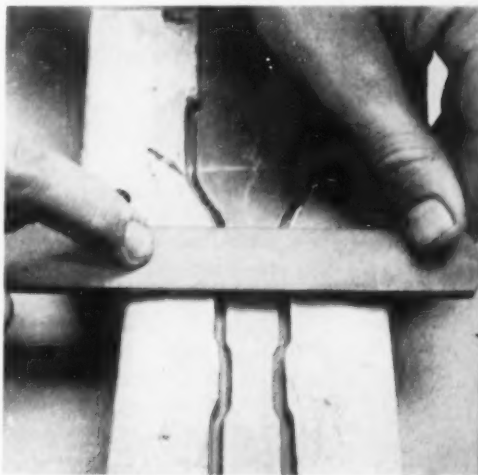


Fig. 6—Even though cured Epon resin formulation is tough and impact resistant, it can be machined. Small amounts of excess formulation are filed off to complete repair.

"... repair of the plastic die should not take more than one hour ..."

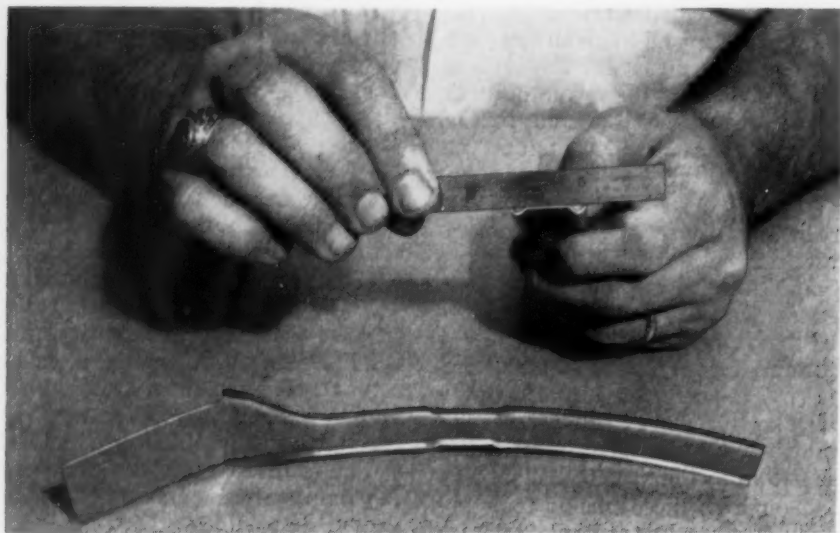


Fig. 7—These samples have been formed on a 90-ton press, using the steel-epoxy die combination. Note the degree of curvature and small radii which have to be produced.

All told, the repair of the plastic die should not take more than one

hour of a man's time plus a few hours in order to cure the unit.

★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★

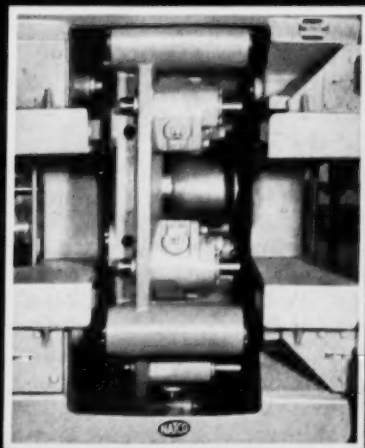
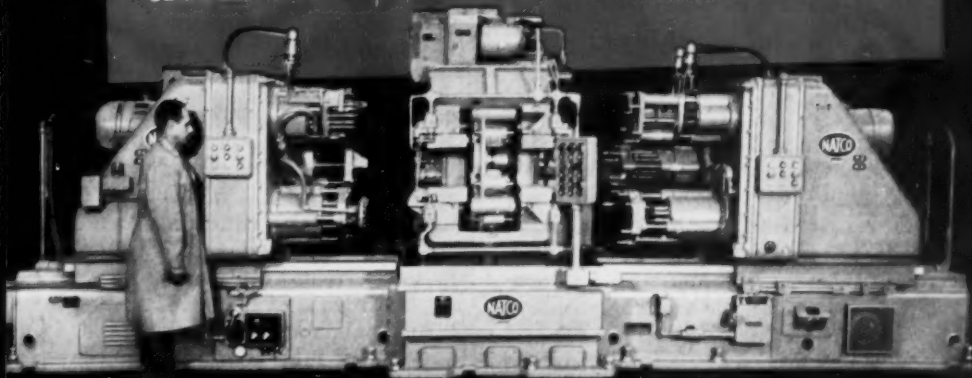
Gear Design and Production.

By Reginald Trautschold. Published by Columbia Graphs, Columbia, Conn. 204 pages. 133 illustrations. Cloth binding, board covers. Price, \$4.50.

This book is especially designed to meet the demand of recent advances in the production of quality gearing. It is a complete, compact and up-to-date gear book, based on wide experience in the field of power transmission. It provides a dependable

guide to assist the designer, builder, user, student and others who wish to obtain concise, practical data in this highly important and exacting field. The main purpose of the book is to restate the principles of gearing concisely, prove the rules and provide convenient formulas for the many critical computations entailed in gear design. The various standard varieties, or classes, of gear units, as well as specific applications, are thoroughly discussed in the book.

COMBINING OPERATIONS on a NATCO Cut Costs and Increased Production!

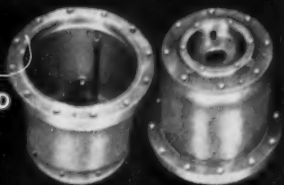


Close-up view of 6 position Trunnion Fixture

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Gear Production Simplified

Sundstrand utilizes precision expanding mandrels to simplify production of gears for standard and special machines.

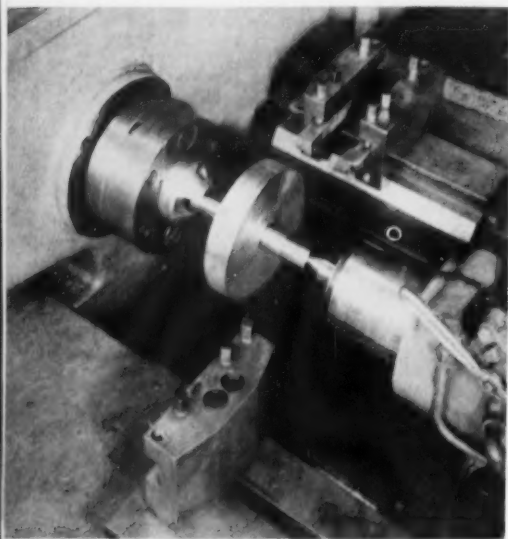
Today's high speed machine tools demand quiet running gears produced to the closest tolerances possible. Recognizing this fact, Sundstrand Machine Tool Co., Rockford, Ill., has already made gears for its own standard and special machines with high precision and accuracy. Recently, a method was discovered for simplifying the

production of these certain gears.

Several steps in the production process have been changed over to utilize "Roll-Lock" precision expanding mandrels which are made by Scully-Jones and Co., Chicago, Ill. These mandrels combine precision with ease of operation. Using an internal-expanding roller taper design, they take advantage of the elastic properties of metal to expand the surface of the mandrel evenly to create an accurate, centering shrink fit in the bore of the gear blank. This fit is accurate within 0.0001 inch and is achieved by a simple twist of the actuating cone.

The mandrels are used on a Sundstrand lathe for the rough turning operation on the gear blanks. This setup assures an accurate relationship between the bore, the o.d. and the sides of the gear. Maximum runout on the finished gear is about 0.0003 inch and little difficulty has been experienced in keeping gears within that tolerance.

When hobbing has been completed, the gears go back on the "Roll-Lock" mandrels for the shaving operation. Once again ease of operation and accuracy of the mandrels become important. Mounting the gear on one of these mandrels



The initial step in gear production at the Sundstrand Machine Tool Company is turning gear blank mounted on "Roll-Lock" mandrel.

with Expanding Mandrels

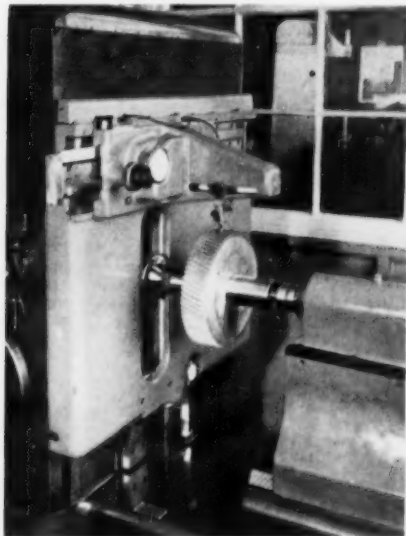
for shaving is no longer a critical step. Very little skill is required for the operator to use the mandrel. It is practically foolproof and will run true in the machine unless seriously damaged.

In fact, the accuracy built into the "Roll-Lock" mandrel is such that its use in the shaving process makes it possible to correct the tooth profile and hold final tolerances within 0.0003 inch. Pitch diameter run-out is virtually eliminated.

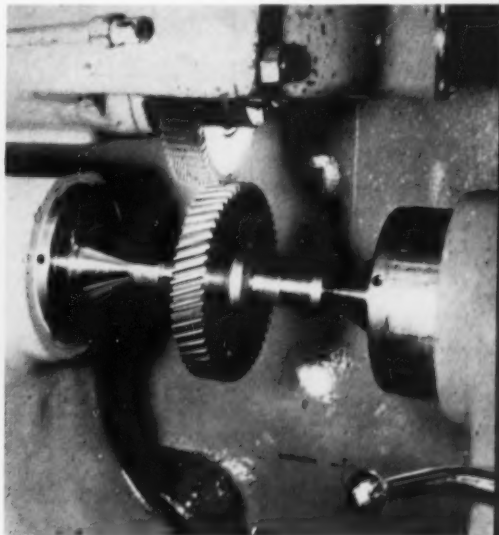
Following shaving and heat treat-

ment, the o.d. of the gear is gripped while the bore is finish ground. Sides are then finish ground on a surface grinder and the gear blank is complete, with every surface square with every other surface.

The gears are then taken to the inspection department where another set of "Roll-Lock" mandrels is maintained solely for inspection purposes. Experience has indicated that the gears run just as true at the final inspection stage as they did at the very first step of production.



In the inspection department of Sundstrand, gears are once again mounted on "Roll-Lock" mandrels to achieve accuracy.



The gear shaving operation performed with the aid of mandrel provides for correction of tooth profile to within 0.0003 inch.

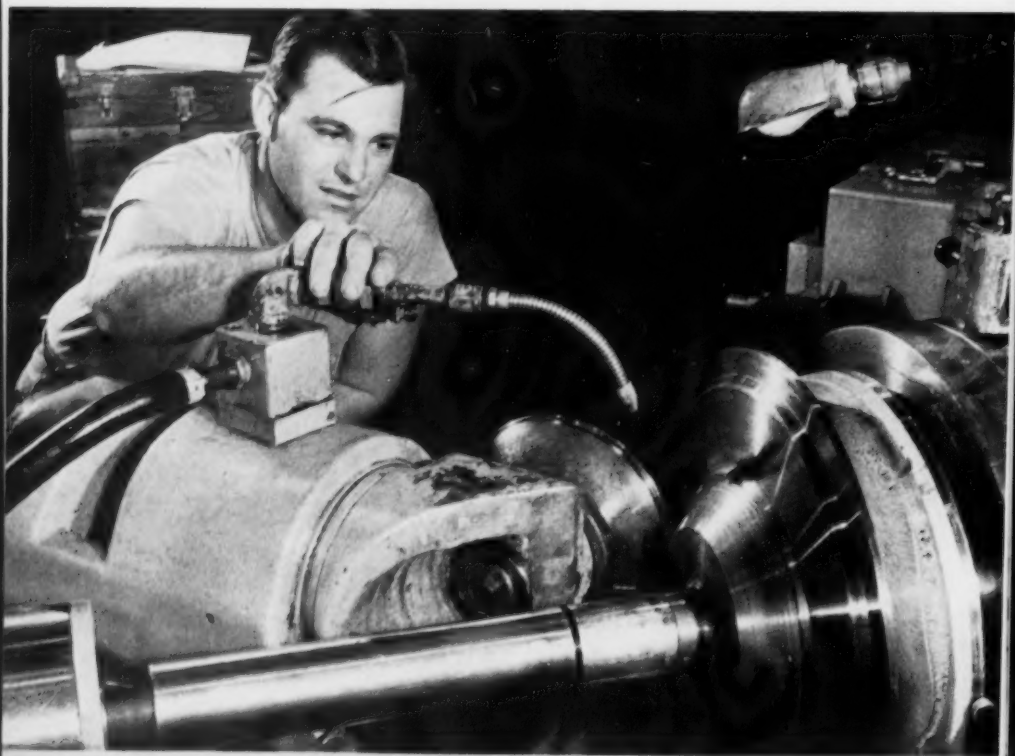
FLOTURNING Jet Engine

Ford Aircraft Engine Division engineers adapt revolutionary process to forming of critical components.

By ROBERT I. SHORE
Managing Editor

Floturning — the cold flowing of metal to a specific shape over a hardened arbor — has developed from a near "impossibility" to a

routine operation at Ford Aircraft Engine Division, Chicago. The Division currently is producing, in ever-increasing quantities, the J-57 turbo-



Flom operator Andrew Youngblood adjusts a coolant nozzle over the roller as he prepares to flom a rear bearing support

blank into a finished part. Note hydraulic shaft, which holds blank against arbor under the tremendous pressure of the roller.

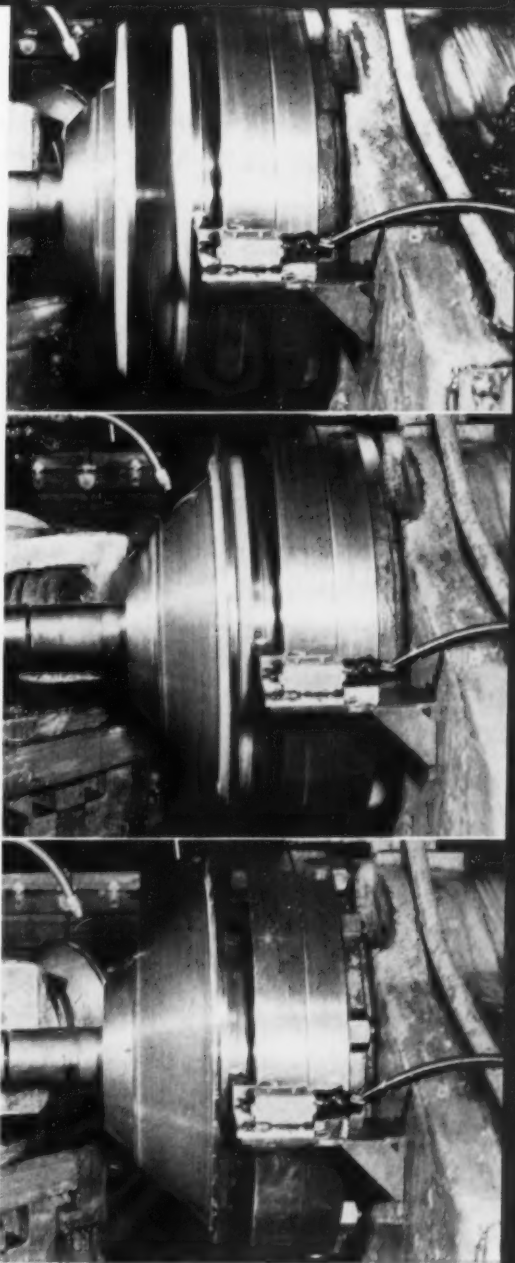
Parts . . .

jet engine, believed to be the most powerful in production anywhere in the free world today. It is officially rated at 10,000 pounds thrust and the addition of an afterburner increases this thrust rating a considerable amount.

The revolutionary process of Floturning is becoming increasingly important in the forming of critical jet engine parts. Developed from the century old metal craft of spinning, the process was introduced by The Lodge & Shipley Company, Cincinnati, Ohio, only a few short years ago.

The J-57 compressor chamber rear liner, or "bullet nose" as it is commonly known, is one outstanding example of the many possibilities of the use of the Floturn machine. Interesting to note is the Semi-Production Department of Ford Aircraft Engine Division, the "trouble shooters" called upon when other sources cannot produce on schedule. This department was given the difficult assignment of developing an efficient method of making the "bullet nose." The Floturn process was employed.

Through the coordinated efforts of the men in the Semi-Production Department, principally Supervisor John Genis, Production Process Engineer William Mallidine and Toolmaker Lyman Webber, an ingenious contour attachment was designed



This series of close-up views dramatically shows Floturning of metal over a precision arbor at Ford Aircraft Engine Division.

"... engineers see a bright future for cold metal forming because of improved quality ..."

for the Floturn machine. The result was a perfect "bullet nose" Floturned in one operation.

Three other parts currently are being Floturned in Semi-Production. In one operation, a finished rear bushing support is completed in less than two minutes. Furthermore, schedules call for the Floturning of an additional 23 parts in the coming year.

Division engineers see a bright future for cold metal forming be-

cause of the improved quality, small waste and substantial savings. Tooling costs have been drastically reduced and results have been uniform.

In yet another example, Floturning of the diffuser inner case has resulted in a material saving of 85 pounds in the rough forging stage.

Semi-Production engineers explained that at present the most important phase of Floturning is in the design and machining of the blank, principally because the proc-



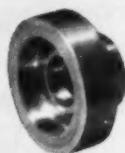
Floturn operator Angelo Califfe (left) and Joseph Southorn, Production Process Engineer, double-check dimensions of Floturned

rear bearing support. In foreground are four parts presently being cold-rolled in Ford Aircraft Engine's Semi-Production Department.

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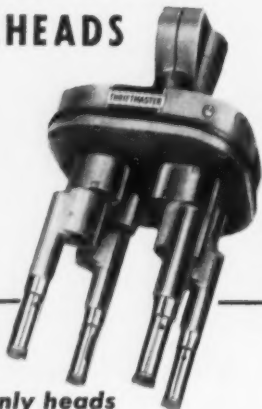
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January, 1956

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"... operation of Floturning machine is easy . . ."

ess must produce a perfect finished part with no additional machining needed on the formed surface.

Arbor design ranks second in importance, followed by selection of a proper roller. The final development involves rework on the roller, arbor and blank and the proper adjustment of speeds and feeds.

Once developed, operation of the Floturning machine is relatively easy to learn. Unlike the spinning craft, handed down from generation to generation and which depended on the individual skill of the craftsman, the Floturning process can be learned by an experienced machinist after only a short training period.

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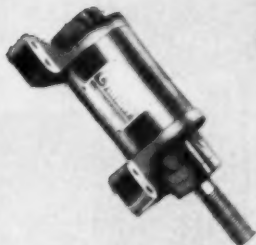


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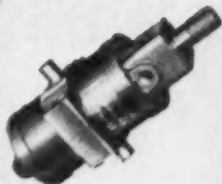


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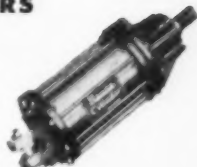


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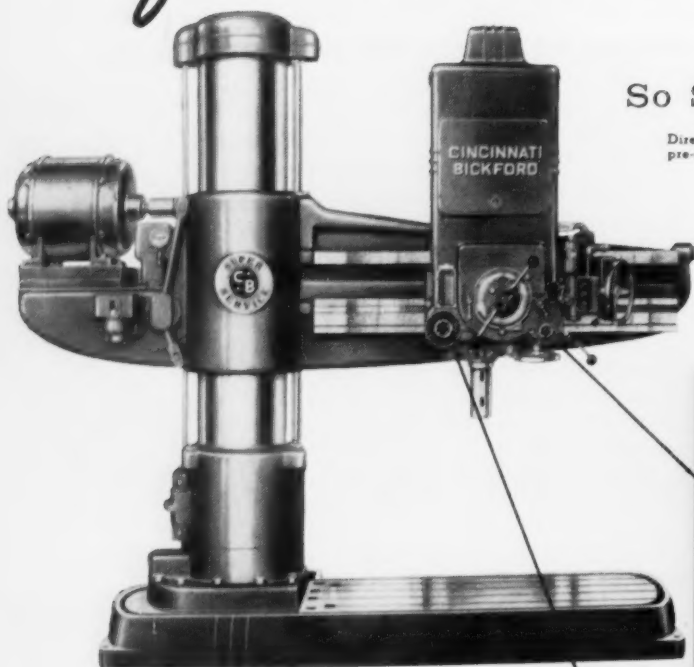
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HANNA ENGINEERING WORKS

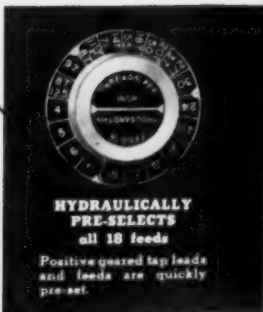
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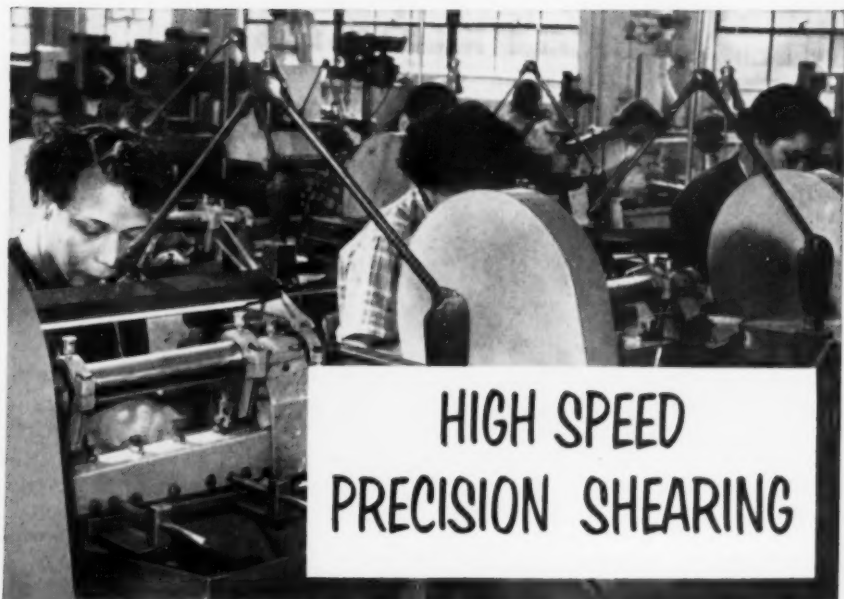
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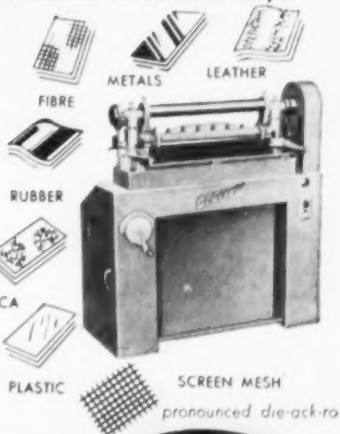
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Mass Production Drilling of Universal Joints

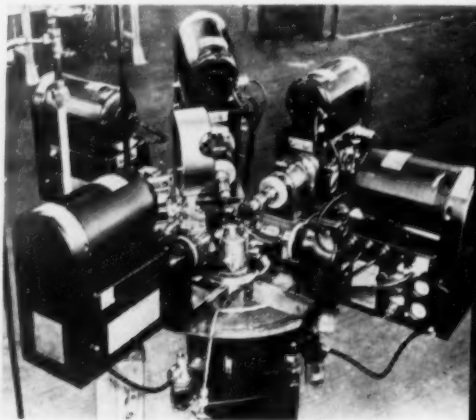
Setup combines ten automatic drill units in two semi-automatic machines to reduce equipment and labor costs.

Ingenuity on a multiple-hole mass production drilling job has saved a Maine manufacturer \$26,000 in original equipment costs and effected labor savings of over three times the cost of the equipment that was purchased to do the job. The problem was to drill four grease holes $1\frac{1}{2}$ inches deep and one tie hole at a 15-degree angle to the plane of the other holes in a forged steel universal joint for the automotive industry. Required production rate is one completed part every 30 seconds. Three-sixteenths inch drills are used for drilling the four holes, and the tie hole is made with the use of a No. 3. drill.

The drilling problem was solved by purchasing ten automatic drill units from The Dumore Co., Racine, Wis., and combining them into two machines, five units each. Mounting was simplified by using standard Dumore mounting tables and mounting brackets. A work-holding fixture was centered on each table with four drill units arranged around it in the same plane and a fifth unit was positioned to drill at a 15-degree angle to the other units. The fixture is easily accessible for loading and un-

ing area required by the drill units.

Operation of the "home-made" drilling machine is semi-automatic. Each drill unit has built-in controls that enable it to operate automatically in sequence or simultaneously with other units. The operator needs only to load and unload the fixture and press one switch to start all five drill units through their cycle. The fixture is automatically actuated through the built-in controls contained in the drill units. Production is currently 1,200 pieces per day.



Setup used by Maine manufacturer for mass production drilling of universal joints.

How the Nicholson Long Angle Lathe file gives you

FASTER, FINER FINISHING

This "specialist" *cuts faster and smoother and lasts longer* than ordinary files in lathe work. It gives a fine, smooth finish to steel and many other metals such as aluminum, brass and bronze.

Correctly used, the Nicholson Long Angle Lathe file clears itself of chips that might otherwise scratch work. It should be handled with a lateral, gliding motion and gentle pressure which gradually increases through the length of the filing stroke. Spindle speed should be high. For a really satin finish, the filer's touch should be delicate. And he should avoid touching the work, because oil and moisture interfere with the file's fine "bite."

Like all Nicholson files, each Long Angle Lathe file is carefully tested for uniformity and accuracy. Made in Flat type, it is recommended for use on *anything* that can be set up and spun in a lathe.

There are many other Nicholson Special Purpose files—and Swiss Pattern files in hundreds of shapes and sizes.

Your Industrial Distributor will gladly give you expert advice on selection and proper use of files. And he'll PROVE to you that this and other Nicholson Special Purpose files can do MORE WORK at LESS COST on YOUR job.

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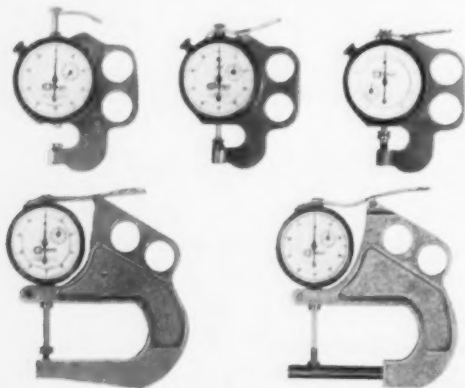


NEW CALIPER *and* THICKNESS GAGES



ALL PURPOSE CALIPER

Here is an instrument designed for the direct measurement of inside and outside dimensions. Caliper arms are readily interchangeable. Other features include provision for rotating the indicator and a two-position pistol grip. Indicator graduated to .010".



PORTABLE THICKNESS GAGES

Here is a series of convenient, easy-to-use gages designed to check the thickness of sheet metal, plastics, and even compressible materials such as leather. They are also useful for measuring diameters, lengths, and other dimensions of small parts. Deep-throated long range models are useful for clearing obstructions. Model shown at lower right is particularly well suited to measuring the wall thickness of tubing. Model shown at upper right is graduated to .0001"; other models graduated to .001".

FOR DETAILS WRITE TO

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WHAT CAPTURED INTEREST OF VISITORS

German Machine

*Brief descriptions of tools and equipment,
displayed at the Hanover exhibition.*

During the same time that American machine tool manufacturers were displaying their latest developments in Chicago last September, some 600 German tool manufacturers were sponsoring a similar exhibition at Hanover, Germany. Like many American built tools recently placed on the market, a number of the German tools featured "automation," tracer controlled mechanisms and also memory devices which store instructions for entire production cycles.

Some idea of where the German metalworking industry and particularly the machine tool industry stand today can be gained from a glance at the following brief descriptions of tools and equipment displayed at the Hanover exhibition. These are the developments that captured the interest of visitors:

Lathes Improved

Automatic, electro-hydraulic turning and boring machine, adaptable also to automatic and manual operation — double-columns turning and boring mills — lathe for working large flat surfaces—another special design offering extra depths for wider range of use than possible with ordinary lathes — electro-magnetic clutches and other controls to pre-

vent undue vibration in engaging and disengaging work—lathe for aluminum alloys—automatic multi-tool lathe for use with work held in chuck or between centers — high-speed lathe designed for mass-production requirements — auxiliary motor for extra slow lathe speeds—novel suction device to clear work area on lathes of chips and swarf—simplified controls — small lathes for watch making or precision parts—special lathe design for carbide tool requirements—lathe with vacuum tube to feed rectified alternating current to d.c. shunt-wound motor for absolute, smooth speed control.

Milling Machines Perfected

Automatic hobbing machine capable of record 700 f.p.m. speeds requiring only on-and-off-switch operation — automatic feeders for hobbing machines—attachment for hobbing machines shifts work from gear to gear automatically — new type spline shaft hob for straight tooth hobbing, equipped with electromagnetic clutch and hydraulic controls, ideal for hobbing shafts with recesses in surface—tool and die sinking machine for extreme accuracy in making jigs and fixtures, for use also in micro-drilling—horizontal miller with automatic table feed and rapid

AT THE

Tool Exhibition

power traverse — contour milling machine with twin spindles for machining two separate surfaces, suitable particularly for large castings — high-speed universal milling machine for metal pattern-making requirements — knee-type milling machine for bulky pieces — rotary type miller for sewing and engine machine parts — optical controls for milling machines for accuracy up to 0.0011 inch — horizontal milling machine with automatic controls and simplified single lever for manual operations — pantograph for making enlarged and reduced scale copies with contour miller capable of handling workpieces up to 1,300 lb. in weight — automatic profiling machine in which work and pattern are both held stationary due to three-dimensional flexibility of tool — miller with automatic table and vertical spindle movements — automatic or manual crankshaft and milling machine — milling machines for watch, optical and precision industries — Micro-drills with micro-set boring tools — pushbutton controls for micro-graduated jig borer with optical measuring accuracy under 0.00004 inch — turret type drill heads — production line setup for machining cylinder heads and covers of truck engines with one-man centralized controls.

Planing Machine Developments

New single-column planing machine equipped with copying or pro-

filng attachment — high-speed planers built particularly for use with carbide tools — gear shaping machine with two cutters for doubling production, also with hydraulically-actuated ram movement for uniform cutting speeds throughout stroke.

Grinders More Versatile

Grinders for rough or micro-finish-ing on hardened steel, cast iron or plastics with hydraulic power feed; for wet or dry grinding with accuracy to 0.00004 inch; for grinding inside and outside of cylindrical surfaces — special models for grinding strips, cutting tools — twin grinding for cylinder blocks and heads — a new development "spot-grind scraping" — a new hydraulic feed system which lessens grinding pressure as grinder approaches final measurement, thus to avoid distortion due to heat and grinding pressures.

Thread Cutting with Push Buttons

Fully automatic threadcutting machine with pushbutton control — high-speed thread cutter designed for lead screws and which can use carbide-tipped tools.

Saws More Specialized

Improved powered hacksaws offering faster cutting at less cost — bevel cutting circular cold saw — portable circular metal cutting saw — portable pipe cutting machine for construction sites with automatic on-and-off switch and a special device for re-

Machine Tool Exhibition . . .

moving burr from pipe interior—adhesive cut-off machine ideal for use in trimming and dressing castings in foundries.

Metalworking Better and Safer

Twin-column plate shear with optically projected cutting line for fast-

er sheet metal cutting; it cuts edges ready for welding — small motor-driven plate and profile shear—perforating and billet shears—double-walled eccentric presses — heavy-duty inclined presses — multi-die presses, special models for cans, buckets, and so on—hydraulic single-column drawing press with speeds equal to mechanical presses

—press brake with preset controls for speeds from 7 to 28 strokes per minute — multi-die press with triple staggered punching-out attachment to save 12 per cent in materials — shaping, bending and aligning press for aluminum alloys — electro - hydraulic drop forging hammer — double - sided eccentric press with four photo-electric safety controls — notching machines — electro-hydraulic bending machines.

Other Tools

Automatic welding equipment — cylinder grinding and honing ma-

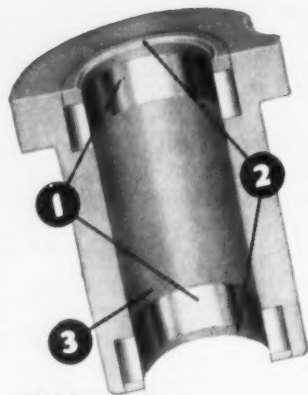
MEYCO CARBIDE INSERTED DRILL JIG BUSHINGS PROVE THEMSELVES

IN Automation !

The reason is simple: these unique bushings are ideally suited for long-running, uninterrupted operations!

MEYCO carbide inserted bushings assure long life for drills, jigs, fixtures . . . accurate work maintained, resulting in less down-time, fewer lost man-hours. Last almost as long as solid carbide bushings, cost slightly more than ordinary bushings. Get the full story:

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1. Tungsten carbide rings at the points of wear; 2. Steel rings protect drills and carbide; 3. Special hardened alloy steel body.

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1888

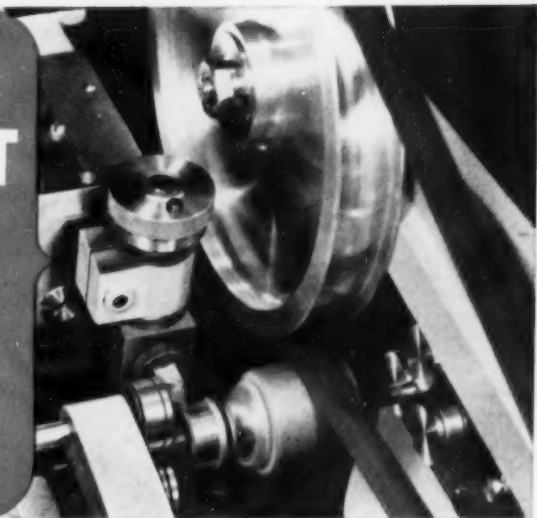


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armature
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concentricity Held to .0002". Commutator turned while armature revolves on its shaft as in normal use. Depth and length of cut performed automatically.

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speed Achieved by simple, quick method of mounting armature between two supports, bringing armature to top speed, and automatically taking cut!

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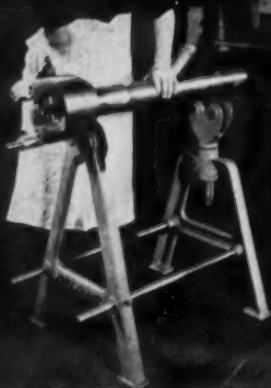


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CAPACITIES		
Swing	Between Standards	Weight Capacity
21 in.	20 in.	12 lbs.
21 in.	20 in.	800 lbs.
43 in.	29 in.	800 lbs.
43 in.	29 in.	2,000 lbs.
6 ft.	5 ft.	5,000 lbs.
8 ft.	8 ft.	10,000 lbs.
Any	Any	24,000 lbs.
43 in.	30 in.	800 lbs.

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Machine Tool Exhibition . . .

chines — instruments for checking tolerances of pistons, pins—high precision feeler gauge—high-speed percussion riveter with 10,000 strokes per minute for precision work in optical, watchmaking and electrical industries — hydraulic brake lining machine which strips old lining, drills and rivets new lining and grinds lining to required size—hob measuring machine — depth micrometer—surface testing and measuring instruments as an aid to faster, better machining, plus other testing devices; in addition a wide selection of manual and precision tools including a variety of original designs.

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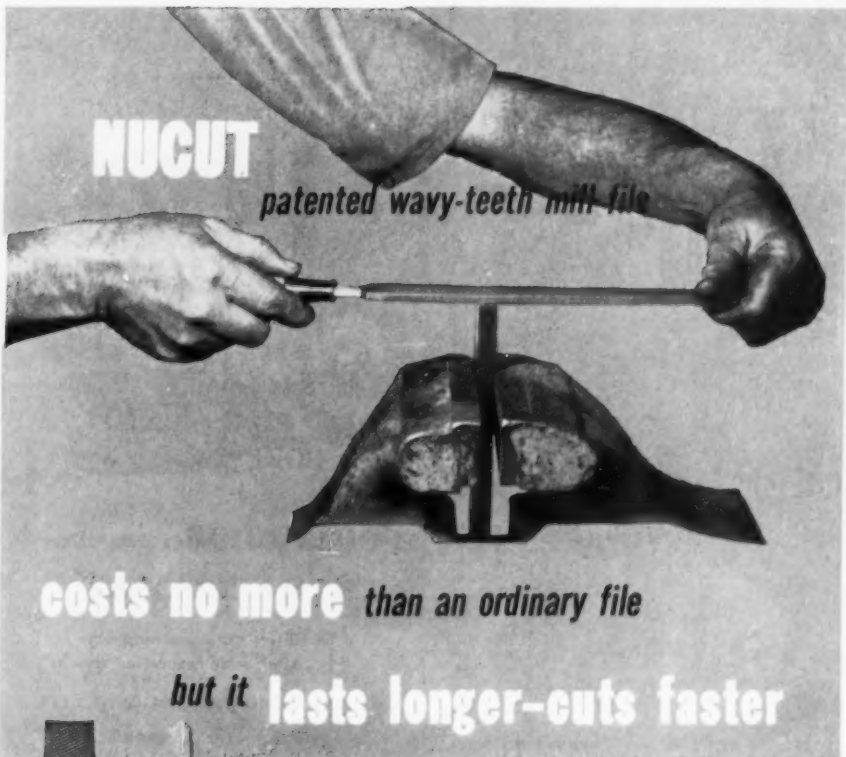


"Whatta' you think of it! I bought it
from a Plumbing Supply House."

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152 modern machine shop

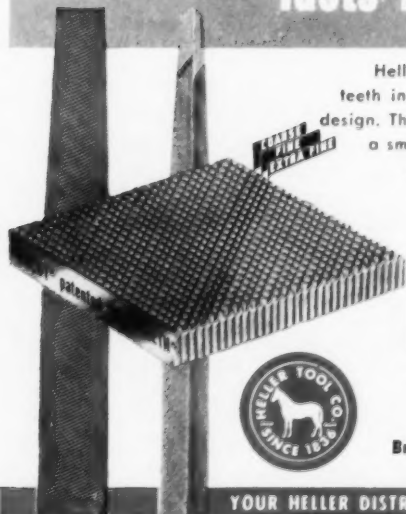
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NUCUT
patented wavy-teeth mill file

costs no more *than an ordinary file*

but it lasts longer—cuts faster



Heller NUCUT files combine coarse, fine and extra fine teeth in a planned irregularity, creating the "wavy-teeth" design. The coarse teeth cut deep, clean; the fine teeth leave a smooth, scratch-free finish. This "Wavy-Teeth" design makes the file clear itself, adds longer life. NUCUT "wavy-teeth" files cut faster without scraping or chattering. Ask your distributor for Heller NUCUT files with patented "wavy-teeth."

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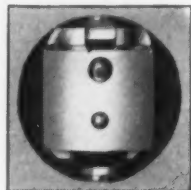
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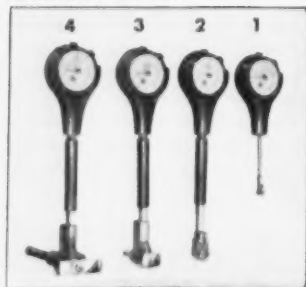
modern machine shop 153

This is IT



Centralizer places contacts on true diameter of hole.

Model 1250P-Series



The New DIAL INDICATOR BORE GAGE

FOOLPROOF CENTRALIZATION

- Meets the great majority of all hole inspection needs.
- Longer gaging range.
- Four gages inspect all diameters from $\frac{1}{2}$ " to 8".
- Accuracy protected from handling temperature.

These new Gages definitely meet the accuracy requirements of nearly all hole diameter inspections . . . and at a cost considerably less than that of more elaborate gaging equipment.

They are designed to give accurate centralization for setup with gage blocks, micrometers, master rings, or other suitable device.

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presses and mills.

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Thor discovers how to muffle air motor noise

75% quieter!



NEW THOR *Silentair* SCREWDRIVERS

*Less noise on your lines means
more production, better employee
relations and morale*

Yes, here is 75% less noise on your production line . . . the great new Thor "Silentair" Screwdrivers! A steel sleeve with 24 perforations is attached over the exhaust of any of these Thor No. 2 series straight screwdrivers. This sleeve, with its acoustical pattern of holes, breaks up and absorbs the sound of the air motor.

Hear the difference between standard air driven screwdrivers and Thor's "Silentair." Try one. Try the other. You'll know what silent air power can mean in your plant.

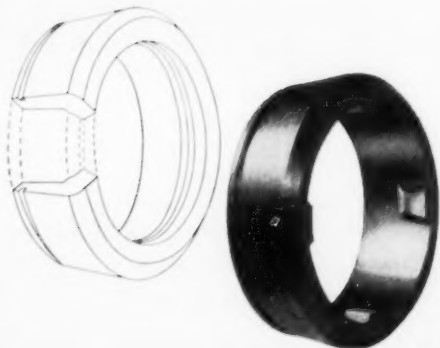
"Silentair" is optional equipment on Thor air screwdrivers—the most powerful available to industry. For a demonstration, contact your Thor factory branch listed below, or write Thor Power Tool Company, Aurora, Ill.



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**I. D. and four
inverted helical splines
BROACHED
the *American* way**

... 300 parts per hour

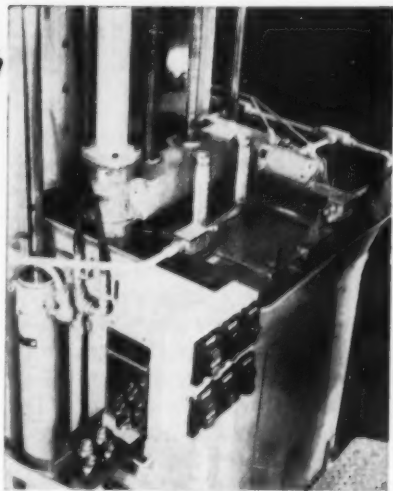
American engineering made this broaching operation fast, automatic and economical.

The finished inside diameter and four inverted helical splines are broached, in this automotive synchronizer ring, two at a time . . . 300 per hour.

American special combination round and spiral spline broaches are used to cut the splines concentric with the I.D.

Feed tubes are here shown as manually loaded but are readily adapted to automation. Parts are fed and ejected by automatic hydraulic slides.

You may have parts that can be produced at significantly lower cost by broaching them the American way. Send part print or sample . . . American engineers will make a recommendation you'll find valuable.



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Automation In Industry

The following article contains the concluding remarks from a talk given by the author before the New England Conference, American Society for Quality Control.

By JACOB J. JAEGER
Vice President, Pratt & Whitney Company, Inc.

Let's look briefly at the manner in which automation affects you and your important work in the field of quality control. At the same time the revolutionary ideas of cutting tools and machine tools were finding their way into productive use, so too, was the gage engineer active in promulgating the use of improved styles of measuring, indicating and recording equipment. It wasn't many years ago that the mechanical indicator, gage block, the vernier height gage, the plug and ring gage, were the backbone of inspection equipment. A quiet, peaceful, evolution has been occurring in your field of responsibilities to control quality. Whole new families of devices have been made available for use in various types of gaging operations.

As the rolling speeds increased in the steel mills, it became necessary to find ways and means of obtaining continuous gaging information so that miles of scrap would not be produced. Speeds have increased so that it was no longer possible for the cleve-

er operator to mike the sheet while on the fly. Today continuous mill gages are used which constantly gage the sheet and with electrical instrumentation indicate and record any offgage dimension to the rolling mill operator in values easily seen or read. Applying the principles of feedback, the rolls can be automatically adjusted so as to correct any deviation.

A whole family of gages has grown out of the electro-limit comparator unit which is so versatile and reliable in indicating small deviations. This device is important because its information is produced in a form that can be handled automatically for reading or recording or, if required, for automatic control. And, too, the non-contacting air gage has found acceptance in all areas of measurements. Here we find a jet of air, emerging from an orifice, capable of measuring or indicating deviation. This, again, is a device that is capable of producing information in a form that can be utilized in many automatic operations.

We might consider some of the types of measuring equipment that are becoming more and more important and that involve the use of radiation. The X-ray gage was the earliest of these forms and today it is rapidly increasing in general usage. Now, to extend this field further, we utilize the developments of the nuclear physicist. Using materials made radioactive in the nuclear reactors of Oak Ridge, today, we find in general use the Beta-Ray as it emanates from a radio-active piece of strontium carbonate. Radiation type gages are capable of producing information in a form that can be used in automatic machinery.

While the production engineer was striving to reduce the direct labor on any given part, so too, the inspection group began to use new automatic techniques to eliminate individual handling and measuring of components. And, as a further extension of this general thought, automatic classification equipment came into general use. You are all familiar with automatic classification equipment used for ball bearings, wrist pins, and pistons, connecting rods, and a wide assortment of similar parts that can be processed automatically through gages and segregated into dimensional groups. Or, going a bit further, you are all familiar with complicated pieces that can be gaged and then marked or stamped with classifications indicating dimensional information. With these efforts, we have not only eliminated individual handling and measurement of components but we have further improved the quality of our product by grading them so that se-

About the Author



JACOB J. JAEGER, vice president and chief engineer of the Machine Tool Division of Pratt & Whitney Company, Inc., has been associated with the firm since 1940. A native of Philadelphia, he joined the company as a research engineer, and in 1948 became assistant manager of machinery engineering. He was appointed chief engineer of the Machinery Division in 1954. A graduate of Drexel Institute of Technology in 1933, Mr. Jaeger received his M.S. degree from Massachusetts Institute of Technology in 1934. Until joining Pratt & Whitney he was a research assistant on the staff of MIT where he did work in the field of mechanical methods of computation. Mr. Jaeger is a member of the American Institute of Electrical Engineers and serves on several of its technical committees. He has been active in committee work of the National Machine Tool Builders' Association and represents that group on the National Electric Code Panel.

**"... machine can be told
what to produce."**

lective assembly can be done economically. This is all old information to you. Where can we look for further improvement? What areas do we have to exploit, to satisfy this demand for more and better things?

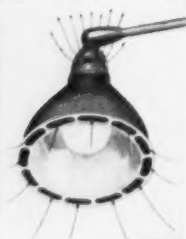
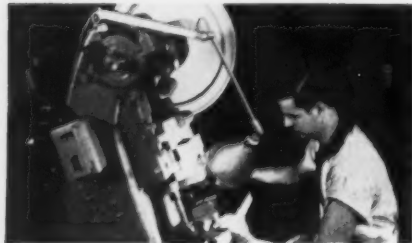
I venture to gaze into the crystal ball and present my prediction of where we are heading in many phases of inspection and manufacturing. With all of this background in diversified fields, and with the accumulation of knowledge in control, the stage is set for the marriage of two techniques — the technique of the process engineer and the machine tool builder with the technique of the inspector and the gage maker. This can bring forth a broad area of automatic control that can influence our entire concept of manufacturing. With the confluence of these efforts, a machine can be created that can be told what to produce and that can be given the opportunity to correct itself. Self-inspection and self-correction; automatic manufacture, automatic inspection and automatic correction of errors! Perhaps now you see why I use the word marriage because here,

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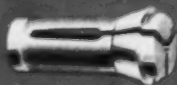
Dept. MM51, Sturgis, Michigan



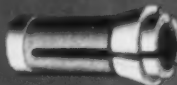
Standard collet for
ACME-GRIDLEY,
CONE, NEW
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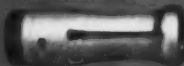
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feeder with inter-
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replaceable pads.



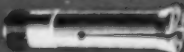
Standard collet for
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GREENLEE AUTO-
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Super (cage-type)
adjustable tension
feeder. For all
Automatics.



Standard collet for
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Now...Old Drills GOOD AS NEW



1 INSERT



2 PUSH



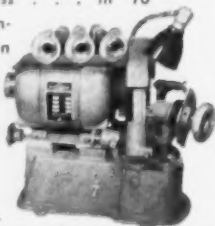
3 TWIST



4 GRIND

The BLACK DIAMOND Drill Grinder restores a worn drill to like-new precision sharpness . . . in 10

seconds! Any inexperienced man (or woman!) is an expert grinder with this unit. Both lips ground at once . . . web-thinning equally simple! Pays for itself many times over!



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"... each piece automatically enters the gage . . ."

all in one package, are all of the elements needed in order to make perfect parts.

How will we do it? We'll do it in the same way that the continuous mill gage automatically controls the screw downs so correct thickness is always being rolled with a minimum of scrap and a maximum of zero tolerance material. This idea is not new; it has been done in the past in simple forms but its application on a broader scale is the thing I look forward to. In the past, we have seen external grinders that continuously measure a part while in process and that cut off the in-feed when the gage informs the machine that it has reached the proper dimension. This is a simple application. The gage can be introduced without interference with the grinding wheel; the part is relatively clean and a minimum of vibration is experienced. The operations are relatively slow and the whole equipment can be put together with a minimum of effort. A similar approach to internal grinding, for instance, has been used wherein a plug gage is tried in the hole with each pass of the wheel and the feed cut off as soon as the gage enters the hole.

Let's consider for a moment a slightly more complicated operation where it is impossible to gage during machining process. Suppose we place the gaging equipment at the exit of the machine so that as each piece is produced it automatically enters the gage and is checked.

"Home-made" Automatic Drill set-up cuts drilling costs from 2¢ to 1/10¢ per piece

Two standard Dumore Automatic Drill Units plus low cost tooling boost production for midwest die cast firm.

When Acme Die Casting Corp., Racine, Wisc., bid on a die cast zinc automobile door lock, their price hinged on maintaining high production rates on every phase of the operation. However, when hand drilling two opposed .160" holes, they found it impossible to hold the necessary .002" alignment tolerances as well as maintain the required high hourly production. They began looking for a solution.

Uses Dumore Advisory Service

Working closely with Dumore's Application Advisory Service, the company devised the special purpose machine pictured below. It consists of two Dumore Series 24 Automatic Drill Units designed into a completely automatic set-up that amounted to only a few hundred dollars in tooling and fixture costs. Complete synchronization of stroke, feed and drilling is made possible with effective use of micro-switches.

From 150 to 1500 pieces per hour

By increasing production from 150 to 1500 pieces per hour, drilling costs were reduced from 2¢ to 1/10¢ per piece. Operating at three shifts per day, the Dumore Units and tooling paid for themselves within a matter of weeks.



AN INEXPERIENCED OPERATOR loads the hopper while gravity feed forces the piece into the drilling fixture. The two opposed Dumore Automatic Drill Units advance simultaneously, drill, then retract to starting position—all automatically. The Dumore's built-in electrical and pneumatic controls permit almost unlimited set-up and production possibilities.

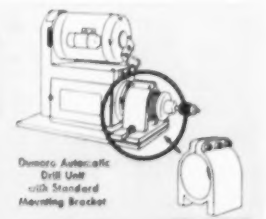
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PART: Zinc Die Cast Automobile Door Lock.

OPERATION: Drill two opposed .160" holes, hold alignment within .002", parallelism .0015".

PRODUCTION: 1500 pieces per hour, or 25 per minute.



QUICK REMOVAL and transfer of Dumore Units to other parts of the shop for drilling, tapping, reaming and other related operations is made possible with their unique nose mounting bracket. Quickly adapts Unit at any angle to existing shop equipment.

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"... automatic reading causes a tool adjustment ..."

Acceptable parts may be run down one chute, rejects through a second chute. We could cause the machine to shut down if two successive rejections occur, giving the operator the opportunity in this event to make

machine corrections as a result of the readings on the gages.

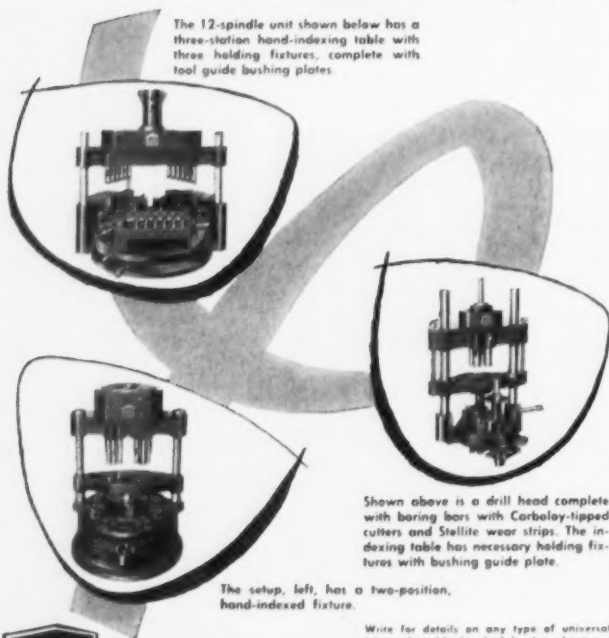
As a further extension of this principle, suppose, as we gage each piece at the completion of its operation, that automatic reading causes a tool adjustment so that the part heads towards the center of tolerance. As tool wear occurs, the tool could be gradually advanced, keep-

ing the parts within a narrow tolerance band. Further, when the tool has advanced due to wear beyond desirable limits for quality of the parts or regrind of the tool, a new tool or new cutting edge of the same tool could be brought into play, the slide retracted, and again self-adjusted so as to find the center of tolerance.

I am sure that, as the opportunity is presented, many unique and ingenious combinations of machine control and inspection devices will find their application in industry. Given the demand and a clear delin-

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The 12-spindle unit shown below has a three-station hand-indexing table with three holding fixtures, complete with tool guide bushing plates.



Shown above is a drill head complete with boring bars with Carbide-tipped cutters and Stellite wear strips. The indexing table has necessary holding fixtures with bushing guide plate.

The setup, left, has a two-position, hand-indexed fixture.

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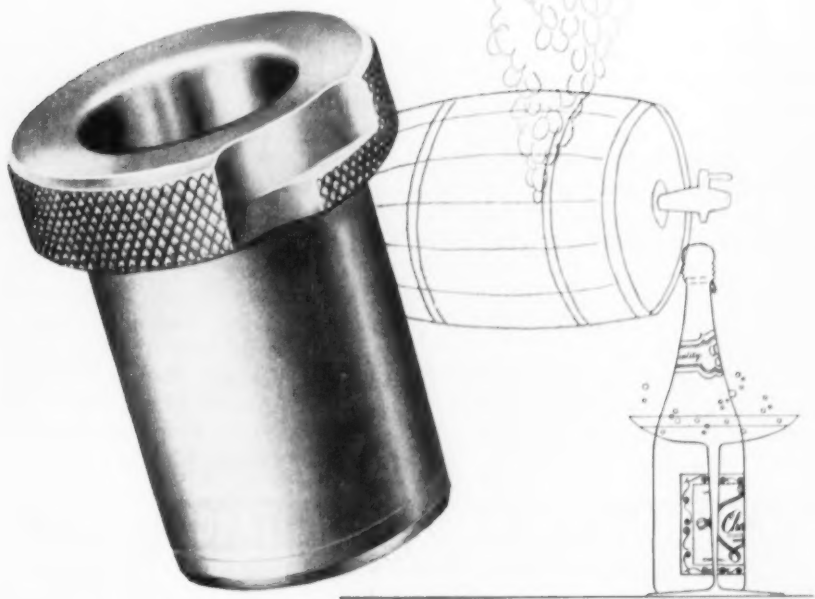


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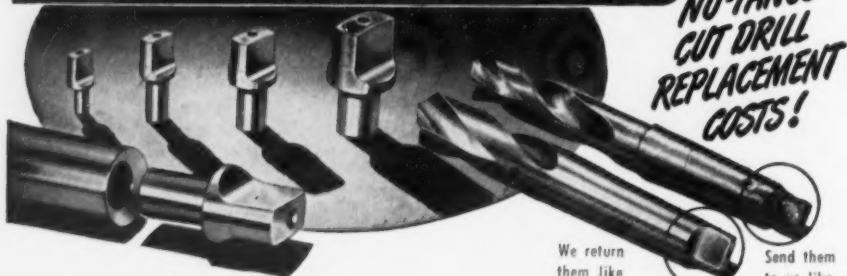
eation of requirements, it appears to me that virtually any problem, within reason, is capable of at least a partial solution. There remains only the justification of the economics of the situation.

What is the ultimate result of an approach of this sort to automatic operation? I think it has the qualities that will produce better and better assemblies. I think it will cause us to change our concepts of manufacturing that involve selective assembly. It would be no modest gain if parts could be produced that would eliminate the need of selective assembly. Selective assembly, to me, is only an admission that we are

capable of inspecting parts much closer than we can make them. If machinery can be developed which will always tend to make parts in the center of tolerance and within the same spreads that are possible for short periods of time, it seems to me that a considerably more desirable product can be produced. Furthermore, produced at a reasonable cost. I believe systems of this sort can be expected to produce parts of higher quality, with less scrap, and with less exacting skills on the part of the machine operator.

The solutions to these problems will not be easy ones either from a technical standpoint or from a personnel standpoint. Successful installations of this form of equipment will only result from an intense cooperative effort of all of the people in-

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"... gains will not be accomplished without penalties."

volved: the process engineer, the machine tool builder, the inspector, the gage maker, and the shop operating personnel. Each must contribute his knowledge to the pool. Each must give his needs, his desires, and

his compromises. But the goal is worthy of the effort since it will contribute measurably to the need for making better parts with less scrap in shorter time.

Although it is interesting to speculate on the future of automatic control, it is also necessary from time to time to become completely practical and consider problems that

may be created in industry as the result of the application of these more complex systems. New gains will not be accomplished without some penalties. There will be many heartaches and many failures, but I am sure the results will be worth them.

It is equally necessary that we constantly re-examine our programs of personnel training and education in order that our people may comprehend not only the technical problems we face but the social problems as well.

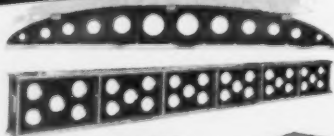
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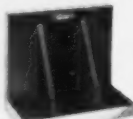
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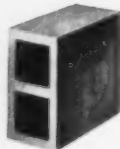
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the development and application of more and more complex automatic machinery. There's no bugaboo or mystery about it. All of this comes as the result of ever increasing demands for more things and better things and less expensive things. Certainly there's no evidence that these demands will cease or even ease a little bit.

But we must be conscious at all times of the fact that sound growth in our economy can result only from an intelligent application of equally sound fundamentals; that a better way of living can be achieved only if everyone profits. This comes about by evolution; not by revolution. And I feel that you here can be proud of the fact that you are contributing, each his small mite, to a finer world and a happier way of enjoying it.

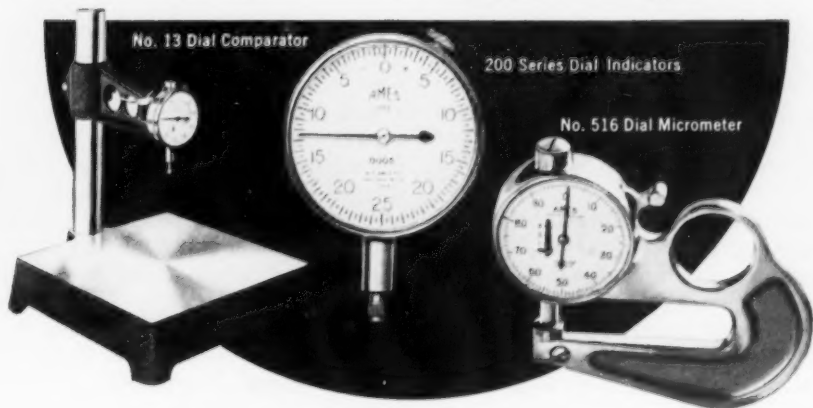
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January, 1956

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January, 1956

modern machine shop 171

ideas from readers

FOUR time-saving suggestions for the man in the shop.

Modified Chuck Jaw for Holding Irregular Castings Concentrically

By R. KNUTSON

Figure 1 shows an example of a casting that cannot be readily held concentrically by a geared three-jaw chuck; the upper part of the casting interferes with the upper jaw. In order to reach around the upper contour of the casting and to grip the

casting on its circular surfaces, the top part of the top jaw is removed from the master jaw *A*, as shown in Fig. 2, and replaced by a rocker assembly, *B*, which, in turn, is held to the master jaw by a shoulder bolt, *C*. Since there is a few thousandths of an inch clearance between the bolt head and rocker jaw *B*, the rocker is free to equalize any slight irregularities of the casting.

When designing and building the rocker, it is important to achieve an accurate dimension from the tangent

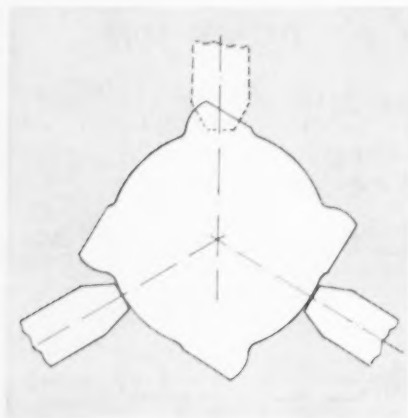


Fig. 1—Example of casting difficult to hold concentrically by geared 3-jaw chuck.

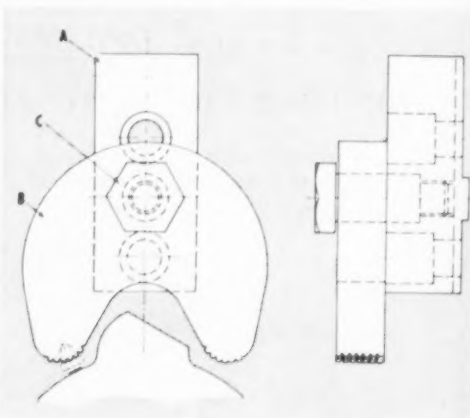


Fig. 2—Modified chuck jaw for holding concentrically casting of type shown in Fig. 1.

point of the rocker jaw to the pivot hole. If the necessary accuracy is not obtainable, it is possible to drill and tap into the tangent points and insert set screws with lock nuts, as shown in broken lines on one of the rocker halves. This modification provides for ready readjustment and ease of obtaining the concentricity that is desired.

★ ★ ★

Thread Burring Tool

By J. B. KIGHTLINGER

Wilson Mfg. Co., Inc.,
Wichita Falls, Texas

We make many thousands of screws and bolts each year for use on our products. These include parts having $\frac{3}{8}$ -inch N. C. and N. F. threads to $1\frac{1}{2}$ -inch N. C. and N. F. threads. The majority of these parts are made on automatic screw machines. After each part is threaded, a cotter pin hole is drilled in the

thread. This presents a problem of removing the burr from the thread so that a nut can be freely screwed on the part.

Previously, we sent the bolts and screws to the burring department to have the burr filed off, which was a slow and costly operation. Also, the workman doing the job disliked it very much.

To facilitate the thread burring operation, the writer designed the burring tool shown in Figs. 1 and 2. Since this new device has been put into service, thread burring is no problem. In fact, one of our men working on the burr bench, who is totally blind, can operate the burring tool as efficiently as any of his co-workers.

The tool is made by using a piece of flat bar stock and a rethreading nut die. The nut die is ground round on the outside, leaving a flange on each side to keep it centrally located. The flat bar stock is bored out to the same diameter ground on the nut



Fig. 1—Illustration showing shop-made thread deburring tool in open position.



Fig. 2—Illustration showing shop-made thread deburring tool in closed position.

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die. The nut die is then cut in two with an abrasive cutoff wheel so that the parting line is as shown in Fig. 1. The next steps consist of splitting the holder, inserting the split die to keep the bore in register, and then silver soldering a strap hinge on each side, after which the holder is drilled and reamed for a hinge pin and a handle is brazed or welded on the holder. A screw for adjusting the die to the thread pitch diameter is inserted on the parting line of the die holder and a locking screw is provided on the side of the holder to hold it after adjustment is made.

This style holder was adopted so that the bottom half of the holder could be held in a vise. This enables the operator to insert the bolt or screw with one hand and close the die with the other. The part to be burred is turned one half revolution, the die is opened and the part removed.

The nut die is held in the holder by peening the edge of the bored hole in the holder over the parting line of the die, which is situated 1/32 inch below the surface of the die holder.

★ ★ ★

Lifting Device for Large Boring Bars

By H. G. FROMMER

When large boring bars are used to bore or ream holes in conjunction with vertical machines, these bars can be handled with ease and

January, 1956

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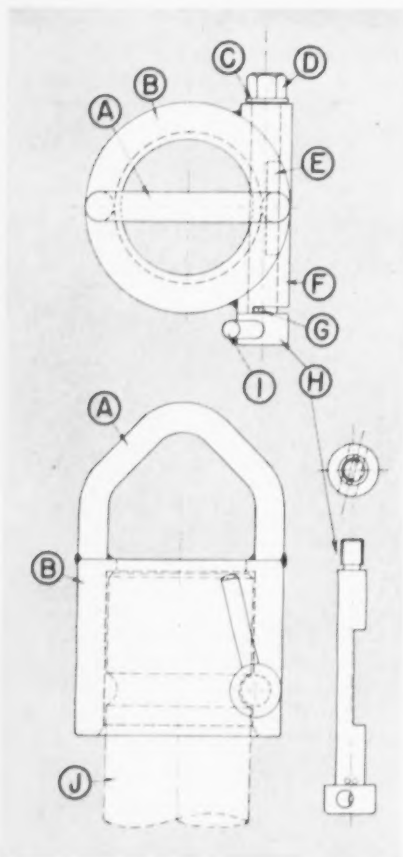
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without loss of time by the use of a lifting device as shown in the accompanying sketch. The boring bar *J*, used in a six-foot radial drill press, is driven by a magic chuck and guided by bushings within the boring fixture. To insert the boring bar into the fixture prior to bringing the magic chuck down over the bar to en-



Sketch of lifting device for large boring bars.

gage it, a length of round bar stock, *F*, is welded into a length of tubing, *B*, to form the body of the lifting device. A hook loop, *A*, is next formed and welded to the body, which is then bored to a slip fit with the boring bar *J* and cross-bored for the lock pin *H*, shown in detail in the lower right-hand corner of the sketch. A washer, *C*, and nut, *D*, hold the pin *H* in position, the pin being milled out on one side to provide a flat surface, *E*. A cross handle, *I*, is used to operate the lock pin *H*. A small stop pin, *G*, pressed into the lock pin, limits the motion. (A small section is milled out at the end of the part *F* of the housing to provide a bumping surface for the lock pin.)

The sketch shows the device in handling position as the round surface of the lock pin prevents the bar *J* from falling out; the round surface engages the semi-circular recess of bar *J*. When the bar is to be released, the handle *I* is turned clockwise until the flat surface *E* of the lock pin is in line with the semi-circular recess of bar *J*.

★ ★ ★

Non-Marring Clamp Pin

By CLIFF BOSSMANN

Where a set screw must be employed in securing an internally threaded member to a correspondingly threaded shaft without marring the threads, a simple but effective approach to the task is shown in the accompanying sketch. It will be noted that the clamping end of the pin *A* has the same contour as the threads of the shaft or screw *B*

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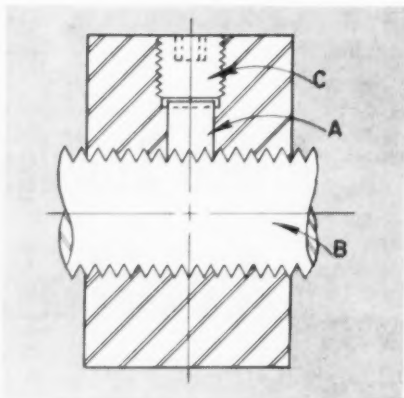
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to prevent marring of the threads.

To install the clamp pin A, the hole accommodating the pin is reamed with a standard diameter reamer, after which the pin is machined to such a diameter that it has to be lightly pressed into the hole so that the pin will not rotate when the main hole is tapped for the shaft or screw B. During the performance of the main hole tapping operation, the desired contour is also produced on the end of the clamp pin A. After the hole has been properly tapped, the screw B is then threaded therein and locked firmly in place by tightening the screw C.

It is absolutely essential that the proper fit be obtained in inserting the clamp pin A in its hole since, if

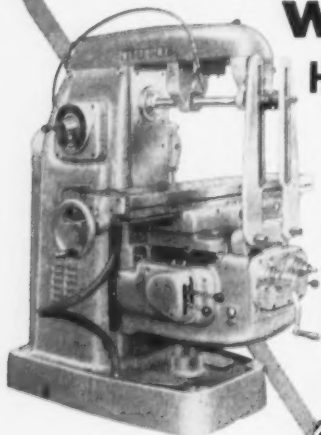


Sketch showing arrangement for securing internally threaded member to correspondingly threaded shaft without marring threads.

the pin fits too tightly therein, the socket set screw C will not be able to move the pin against the thread of the screw B.

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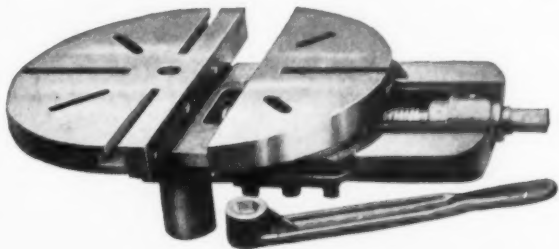
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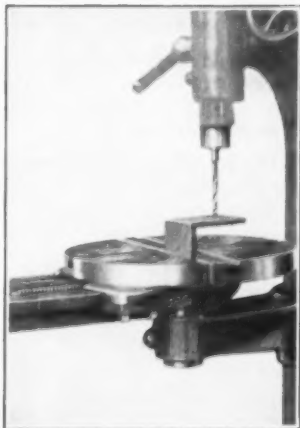
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Boyar-Schultz Corp., 2020 S. 25th Ave., Broadview, Ill. Precision-made alloy-steel T-Slot bolts.

11. Gear and Rack Facilities

Braun Gear Co., 239 Richmond St., Brooklyn, N. Y. "A Visit with Braun."

12. Process Controller

Bryant Chucking Grinder Co., Springfield, Vt. Process controller for machines which incorporate automatic adjustment features.

13. Tap Bushings

Byco Industries, 2302 E. 31st St., Minneapolis 6, Minn. Tap bushing with a square broached hole.

14. Floor Drilling Machines

Cincinnati Lathe and Tool Co., 3265 Disney St., Cincinnati 9, Ohio. 21-inch stationary head floor drilling machine.

15. Cutting Fluids

Cincinnati Milling Products Division, The Cincinnati Milling Machine Co., Cincinnati 9, Ohio. "Cimplus," a cutting fluid for grinding, machining and for use as a water conditioner.

16. Press Brakes

The Cleveland Crane & Engineering Co., 6457 E. 281st St., Wickliffe, Ohio. Steelweld Press Brakes.



Strippers Cut Costs

RUBBER STRIPPER



Stripping with R-B rubber strippers or R-B rubber covered spring strippers eliminates costly metal strippers. Both types of R-B strippers serve the same purpose—rubber strippers are used with smaller punches having shank diameters up to and including $\frac{1}{8}$ " ; rubber covered spring strippers are recommended for punch shank diameters larger than $\frac{1}{8}$ ". Use R-B strippers—to save the cost of making strippers—to substantially reduce installation time—for reduced maintenance.

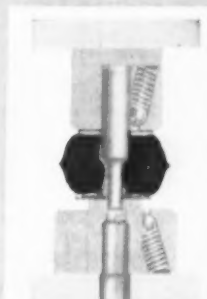
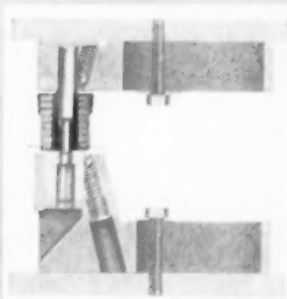


Illustration above shows rubber stripper on punch shank. In this type of application R-B strippers are held to punch shank by friction.

RUBBER COVERED SPRING STRIPPER



To the right is a cross section illustration showing how rubber covered spring strippers (also rubber strippers) are used with R-B Flex-Mount retainers.



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ZINC ALLOYS OR PLASTICS

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17. Driller and Tapper

The Cleveland Tapping Machine Co., Canton 6, Ohio. The Cleveland Jr. Multi-Spindle Drill-Tapper.

18. Surface Plates

Collins Microflat Co., 2326 E. 8th St., Los Angeles 21, Calif. Technical manual on black granite surface plates.

19. Optical Comparator

Covel Mfg. Co., Benton Harbor, Mich. Optical comparator for quick, economical precision inspection and checking.

20. Automatic Feed Presses

Danly Machine Specialties, Inc., 2100 S. Laramie Ave., Chicago 50, Ill. "Autofeed" Series H. Presses.

21. Metalcutting Lathe

Delta Power Tool Division, Rockwell Mfg. Co., 606M N. Lexington Ave., Pittsburgh 8, Pa. Long-bed, 11-inch metalcutting lathe.

22. Power Sawing

The DoAll Co., 254 N. Laurel Ave., Des Plaines, Ill. "Power Sawing Handbook," a pocket-size handbook on the subject of cut-off work.

23. Magnesium Tooling Plate

The Dow Chemical Co., Magnesium Sales Dept. MA 320P-1, Midland, Mich. Lightweight magnesium tooling plate for portable fixtures.

24. Broaches

The duMont Corp., Greenfield, Mass. Standard broach kits, standard and special broaches and bushings.

25. Drilling Equipment

Dumore Precision Tools, 1302 Seventeenth St., Racine, Wis. Automatic drill units, automatic drill heads and small diameter drill grinders.

26. Metalworking Tools

The Eaton Co., 65 Zabriskie St., Hackensack, N. J. Complete lines of machine tools, cutting tools and gages.

27. Materials Handling

Economy Engineering Co., 4507 W. Lake St., Chicago 24, Ill. Overhead service lifters and materials handling machines.

28. Drilling Units

Electro-Mechano Co., 265 E. Erie St., Milwaukee 2, Wis. Model 111 Pad-Mounted Automatic Drilling Units.

29. Abrasive Belt Grinding

The Engelberg Huller Co., Inc., 112 Seneca St., Syracuse, N. Y. "How Abrasive Belt Grinding Increases Production."

30. Boring Machines

Ex-Cell-O Corp., 1200 Oakman Blvd., Detroit 32, Mich. Styles 308 and 312 Cam-Operated Boring Machines.

31. Power Presses

Famco Machine Co., 3122 Sheridan Rd., Kenosha, Wis. Open-back inclinable power presses.

32. Dial Indicators and Gages

Federal Products Corp., 51412 Eddy St., Providence 1, R. I. Dial indicators and dial indicator gages.

33. O.B.I. Presses

Ferracute Machine Co., Bridgeton, N. J. "C Thirty" Series Open-Back Inclinable Presses in 32, 43, 56, 70, 88 and 110-ton models.

34. Carbide End Mills

M. A. Ford Mfg. Co., Inc., 732 W. River St., Davenport, Iowa. Complete line of solid carbide end mills for rough and finish machining.

35. Disc Grinder

Gardner Machine Co., Beloit, Wis. 2V18 Precision Double Disc Grinder for generating parallel and flat surfaces.

36. Vertical Milling Machines

George Gorton Machine Co., 1710 Racine St., Racine, Wis. "Mastermil" High-Speed Vertical Milling Machines.

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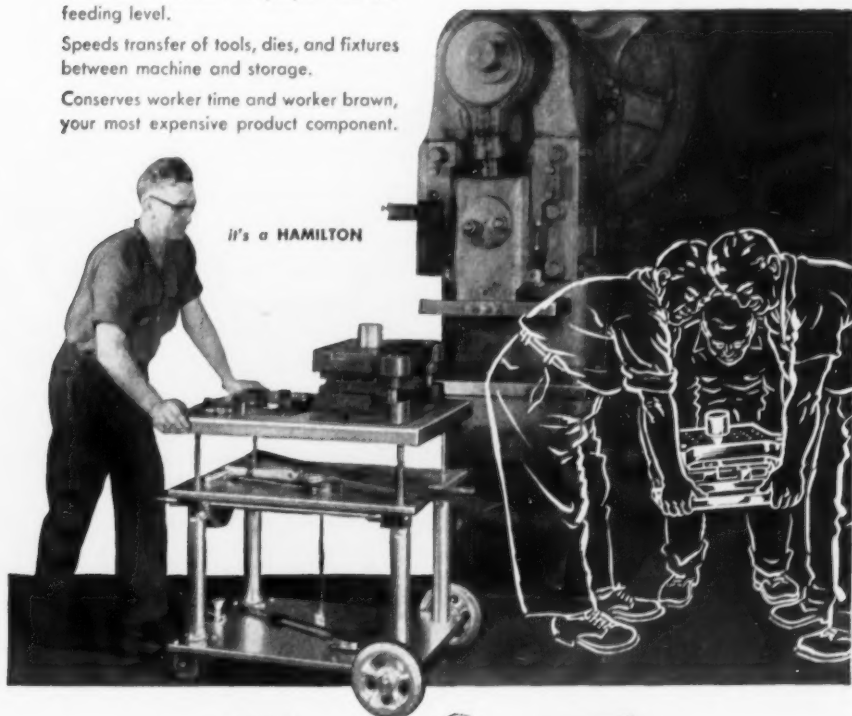
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37. Automatic Bar Machines

Greenlee Bros. & Co., 1892 Mason Ave., Rockford, Ill. Six-spindle bar automatic with increased speed.

38. Collet Chucks

Hardinge Brothers, Inc., Elmira, N. Y. Hardinge-Sjogren speed collet chucks.

39. Iron Bender

Hossfeld Mfg. Co., 402 W. 3rd St., Winona, Minn. Wrenchless type universal iron bender.

40. Electric Motors

Howell Electric Motors Co., Howell, Mich. Series 100 motors.

41. Tracer Lathes

Hydra-Feed Machine Tool Corp., 730 W. Eight Mile Rd., Ferndale, Mich. Copy turning with Hydra-Feed tracer lathes.

42. End Mills

Illinois Tool Works, 2501 N. Keeler Ave., Chicago 39, Ill. "Tri-mil" End Mill.

43. Micro-Indicator

C. E. Johansson Gage Co., 10641 Hagerty Ave., Dearborn 1, Mich. Mini-kator No. 590, a micro-indicator designed for transferring dimensions and measuring in inaccessible places.

44. Gaging Threads

The Johnson Gage Co., Bloomfield, Conn. "The Correlation between Screw Thread Standards and Gaging Systems."

45. Air Clamps

Lapeer Mfg. Co., 3048 Davison Rd., Lapeer, Mich. Heavy-duty air or oil clamps designed to stand up under knocks and abuses.

46. Cold-Finished Steel Bars

La Salle Steel Co., 1412 150th St., Hammond, Ind. "Residual Stresses in Cold-Finished Steel Bars and Their Effect on Manufactured Parts."

47. Boring Tools

Lehmann Boring Tool Co., Division of Fulton Iron Works Co., 4389 Duncan Ave., St. Louis 10, Mo. Boring bars, boring heads, interchangeable block cutters and flycutter bars.

48. Nondestructive Testing

Magnaflux Corp., 7300 W. Lawrence Ave., Chicago 31, Ill. How a nondestructive testing program can be instituted in the production departments.

49. Metal Carbides

Metal Carbides Corp., Youngstown 7, Ohio. Quick-reference pocket guide to better use of "Talide" Metal.

50. Radiography Projectors

Metal & Thermit Corp., 100 E. 42nd St., New York 17, N. Y. Ket-Ray Projectors for industrial radiography.

51. Worm Gearing

Cone-Drive Gears, Division of Michigan Tool Co., 7171 E. McNichols Rd., Detroit 12, Mich. Worm gearing.

52. Engraving Machines

Mico Instrument Co., 80 Trowbridge St., Cambridge 38, Mass. Engravers, grinders, drill presses and tappers.

53. Single-Point Presses

Niagara Machine & Tool Works, 683 Northland Ave., Buffalo 11, N. Y. Series E, Single-Point, O.B.I. Presses.

54. Grinding Wheels

Norton Co., Worcester 6, Mass. "How to Select Grinding Wheels for Precision Grinding, Tool and Construction Steels."

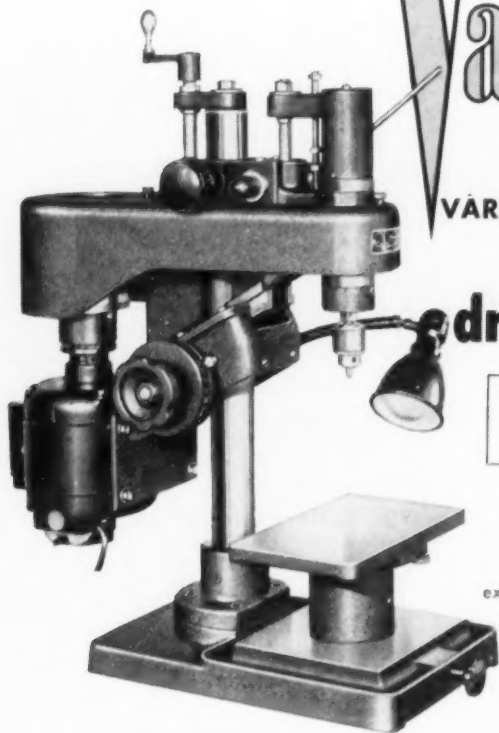
55. Box Finger Brake

O'Neil-Irwin Mfg. Co., 306 8th Ave., Lake City, Minn. "Di-Acro" Box Finger Brakes.

56. Heavy-Duty Bar Racks

Palmer-Shile Co., 16022 Fullerton, Detroit 27, Mich. Tying and storing with portable heavy-duty bar racks.

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57. Molds for Plastics

The Parker Stamp Works, Inc., Hartford, Conn. Molds for plastics and die casting dies.

58. Self-Tapping Screws

Parker-Kalon Division, General American Transportation Corp., Clifton, N. J. Self-tapping screws which start right, drive right, seat right and stay tight.

59. Grinding Wheels

The Peninsular Grinding Wheel Division, Abrasive and Metal Products Co., 729 Meldrum Ave., Detroit 7, Mich. Complete line of grinding wheels.

60. Hole Grinder

Pratt & Whitney Co., Inc., 25 Charter Oak Blvd., West Hartford 1, Conn. No. 2E Vertical Precision Hole Grinder.

61. High Speed Tapping Heads

Procurier Safety Chuck Co., 12 S. Clinton St., Dept. 12, Chicago 6, Ill. Improved high speed tapping heads.

62. Heavy-Duty Straddle Truck

The Raymond Corp., 88-137 Madison St., Greene, N. Y. Straddle-type tiering truck with 4,000-pound capacity.

63. Vise Set

Rockford Engineered Products Co., 2324 23rd Ave., Rockford, Ill. Two-piece vise set for use on T-slot table.

64. Forcing Presses

Rodgers Hydraulic Inc., 7447 Walker St., Minneapolis 16, Minn. Vertical, horizontal and inclined forcing presses in capacities from 100 to 600 tons.

65. Speed Lathes

Schauer Mfg. Co., 4501 Alpine Ave., Cincinnati 36, Ohio. Speed lathes for filing, trimming, deburring, lapping, polishing and other operations.

66. Tap Holders and Drivers

Scully-Jones and Co., 1909 S. Rockwell St., Chicago 8, Ill. Redesigned line of tap holders and drivers.

67. Toolroom Lathe

Stanley Sheppard, 30 Church St., New York 7, N. Y. Harrison 11-inch swing lathe with 24 or 40 inches between the centers.

68. Reinforced Wheels

Simonds Abrasive Co., Philadelphia 37, Pa. "Simex" Reinforced Red Wheels for heavy-duty stock removal jobs.

69. Tapping Machine

Sloan & Chace Mfg. Co., Inc., 344 Hickory St., Kearny, N. J. Model MT Vertical Lever Tapping Machine.

70. Rotary Tables

The John B. Stevens Co., Main St., Somersville, Conn. Rotary tables available in standard and dial types.

71. Anti-Rust Coating Oil

Sun Oil Co., Philadelphia 3, Pa. Sunkote A, an anti-rust coating oil for protection of sheet and strip steel and ferrous castings.

72. Collets and Feeders

Sutton Tool Co., Dept. MMS12, Sturgis, Mich. Collets and feeders with "Diamond Grip" serrations.

73. Step Blocks

Tietzmann Tool Corp., Dept. HK-1, Englewood, Ohio. "Sure Grip" Step Blocks for quick, accurate setups.

74. Vertical Milling Machine

Tree Tool and Die Works, Dept. A, 1600 Junction Ave., Racine, Wis. No. 2UV Vertical Milling Machine.

75. Grooving Tool

Waldes Kohinoor, Inc., 47-16 Austel Place, Long Island City 1, N. Y. Technical manual on Waldes Truarc Grooving Tool.

76. Temperature Cabinets

Webber Engineering Corp., Dept. B-294, P. O. Box 217, Indianapolis 6, Ind. High and low temperature cabinets from 1 to 45 cubic foot capacities.

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S-200 REVIEW OF AIR GAGING

In "A Review of Pneumatic Dimensional Gages," Louis F. Cook, chairman and president of The Sheffield Corporation, summarizes the principles and applications of their applications and uses. Ample illustrations of schematic drawings of pneumatic circuitry and photographs of multiple-dimension and automatic air gages. Contains selective bibliography on air gaging. 24 pages.

S-201 THEORY OF GAGING

In this first of three addresses before the American Society of Mechanical Engineers, this six-page technical paper reviews the operating principles of several types of mechanical, electrical, electronic and pneumatic gages. Many schematic drawings.

S-202 66 CENTURIES OF MEASUREMENT

A commemorative booklet issued at the time the permanent International System of Units was adopted and established at the Smithsonian Institution, Washington, D. C. Includes 16 colored drawings depicting significant periods and advancements in the history of measurement since 4700 B.C.

S-203 VISION IN METROLOGY

Printed from an address by Louis F. Cook, this pocket size booklet tells the story of measurement from the Cubit of the ancients to the "Barn" of the atomic age. In conclusion, the author presents some stimulating thoughts about the methods for dimensional control in the future.

S-204 ELI WHITNEY METROLOGY

LABORATORY

This pocket-size booklet describes the construction, operation and use of the new laboratory for precision measurement. Lists the types of measurement and inspection services available to industry including Gage Block and End Measure Calibration, Hardness Testing, and Surface Finish Analysis.

S-205 CATALOG

Twelve pages, easy-to-read catalog containing applications and engineering data on standard Sheffield control units for automatic machine control, gaging, classifying, and segregating processes. Many photographs and diagrams of typical automated production processes.

S-206 THE SHEFFIELD

A 4-page newspaper written for shop, production, and inspection personnel. Mailed free-of-charge 4 to 6 times a year. Contains feature articles and photographs on new gages and inspection instruments, better inspection practices, and news from Sheffield's Machine Tool Division.

S-215 PLUNJET EXTERNAL GRINDING

GAGES

Engineering Data Sheet showing how a Plunjet gaging cartridge is used with Foster and Arnold Visual Grinding Gages to indicate stock removal evenly without the greater normally associated with a dial indicator reading.

S-216 CRUSTRUE WHEEL DRESSING

PROCESS

What Crustrue is and how it can be used is told in this 12-page catalog. It describes the use of Crustrue true devices available for both surface and cylindrical grinders, and information on their selection. Many case histories and illustrations.

S-217 PRECISION THREAD AND

FORM GRINDERS

Machine information and specifications catalog on Models 101, 103, 105, and 107 Precision Thread and Form Grinders. All models capable of plunge grinding.

S-218 MODEL 109 PRECISION

ANNUAL FORM GRINDER

Use and specification information on this grinder which has a capacity of 12" between centers and will grind a maximum diameter of 4" with a 14" wheel, and will accommodate work up to 7" in diameter.

S-219 MODEL 180 CRUSTRUE

MULTI-FORM GRINDER

An 8-page catalog covering machine features and specifications of new model 180 grinder. This machine uses a 4" diameter wheel and will grind a maximum diameter of up to 10" in diameter and will accommodate a work-part 24" long. Features automatic grinding and gaging, automatic Crustrue grinding and automatic compensation for wheel wear after dressing.

S-220 MODEL 134 PRECISION THREAD

AND FORM GRINDER

Both single and multi-pass models are described in this 8-page catalog. Model 134 is used to grind threads up to 130" diameter x 4" long within a pitch range from 20 to 130. Features automatic grinding, automatic compensation, automatic wheel dressing, and automatic compensation.

S-226 AUTOMATIC WELDING MACHINES

A 4-page Engineering Data Sheet describing both Pulse and Disk type welding machines that are used for automatic welding of point and disk shape contacts of previous and semi-precious metals to small contact arms, lead springs, and instrument components. Examples of metals that can be welded are gold, silver, platinum, palladium, and indium.

S-227 THREADING TOOLS —

TAPS AND DIE HEADS

A 16-page catalog showing a large variety of types and sizes of taps and die heads available from the Murthey Division of Sheffield. Included are collapsible taps and self-opening die heads, solid taps, chasers, and chaser accessories for setting and grinding.

S-228 PRECISION THREADING UNIT —

PRECISION-PAK

The Sheffield PRECISION-PAC™, a self-contained precision threading unit that can be used also for boring, chamfering, and reaming is described in this 4-page catalog. It is available in three sizes: Model 135—1 1/2" to 4"; External 1/2" to 4"; Maximum pitch 8.

S-229 THREAD ROLLING ATTACHMENT —

PRECISION-ROL

A 4-page folder covering five standard models of PRECISION-ROL thread rolling attachments for automatic screw machines and turret lathes. Many case histories with threading production times included.

S-230 VISUAL GAGES

A 20-page catalog on the "Shop Proof" Visual Gage—an indicating comparator which is set by precision gage blocks to reference masters to a certified accuracy of several millionths of an inch. Available in standard 10,000/20,000/30,000/40,000/50,000/60,000/70,000/80,000/90,000/100,000 or 10,000/20,000 to 1.

S-231 ELECTRONIC GAGE BLOCK

COMPARATOR

Engineering Data Sheet covering the Sheffield Electronic Gage Block Comparator that is used to calibrate gage blocks to reference masters to a certified accuracy of several millionths of an inch. Available in standard 10,000/20,000/30,000/40,000/50,000/60,000/70,000/80,000/90,000/100,000 or 10,000/20,000 to 1.

S-232 ELECTRONIC HEIGHT INDICATOR

Engineering Data Sheet on this Height Indicator that has a vertical range 0" to 20" and standard amplification of dual 1,000/2,000 to 1.

S-207 GENERAL CATALOG

New 16-page, fully illustrated General Catalog of Sheffield Precision Products and Subdivisions. Includes: Grinding Machines, Thread Grinding Machines, Taps, Chasers, and Ultrasonic Machine Tools; also, Precision Inspection gages, Automatic and Multiple Precision gages, Toolroom and Inspection Instruments, and Contract Services.

S-208 NON-CONTACT X-RAY GAGE

A 16-page catalog describing the Sheffield "Measuray"—a non-contact X-Ray gage for continuous or intermittent measurement of strip or sheet stock while in motion or stationary—hot or cold. Contains models and illustrations of gages as well as types of materials on which it can be used.

S-209 PRECISIONAIRE INSTRUMENTS

This 30-page catalog and price list on Precisionaire column-type air gages contains the full line of base instruments, with their applications and scales, and complete lists of standard sizes and types of air gauges, air gauges, cartridges, and types and sizes of adjustable air tooling.

S-210 PLUNJET GAGING CARTRIDGES

A 24-page catalog showing types, sizes, applications, tolerance and ranges of Sheffield Plunjet gaging cartridges. Contains engineering and technical data on the operation of the cartridges, and lists of standard dimensions and for machine control applications.

S-211 AIR GAGING JET ENGINE BLADES AND BUCKETS

The critical dimensions and conditions of jet engine blades or buckets and how they are gaged quickly and accurately with Sheffield Precisionaire gages are described in this 28-page catalog.

S-212 ADJUSTABLE AIR GAGE TOOLING

Engineering Data Sheets describing types and sizes of adjustable air gage tooling for use with Precisionaire measuring inside diameters of air gages. Gages for measuring inside diameters include four adjustable spindles with ranges from $\frac{1}{8}$ " to 9.16", 9.16" to 1", 1" to 1.125", and 1.125" to 3"; also, the adjustable Airbore Gage Kit for any size bore from .001" to 12" and the Plunjet Snap gages are available covering the range from 0" to 12".

S-213 AIRETEST INDICATOR

An 8-page Engineering Data Sheet covering the use of the Sheffield Airetest Indicator with the column type Precisionaire tooling. The indicator is used to accurately determine straightness, flatness, parallelism, and squareness.

S-214 PLUNJET STEEL AND STONE FLATNESS GAGES

This Engineering Data Sheet shows how a Plunjet gaging cartridge applied to either a steel or stone surface makes an ideal combination for checking flatness to a high degree of accuracy.

S-221 MICRO-FORM GRINDERS

A 32-page catalog with inserts covering Sheffield's Micro-Form Grinders. These machines grind circular and flat form tools, templates, profile gages, cams, and Crutcher rolls, etc., directly from a drawing of 50:1 ratio. Neither templates nor masters are required. Work is checked without removing from machine.

S-222 MODEL 140 GEAR GRINDER

An 8-page catalog describing machine and specification for the Model 140 gear grinder. This machine is a precision machine that is used to produce precision ground bevel and spur gears from 8 to 50 inch. Crushtruing is used to form the grinding wheel to the basic rack form. Maximum work diameter is 8" and grinding stroke 4".

S-223 GEAR DEBURRING MACHINES

Machine features and specifications of seven models are given in this 16-page catalog. These machines cut, grind, both single and two station models are included.

S-224 GEAR AND SPLINE DEBURRING MACHINES

Six standard models and their specifications are included in this 16-page catalog. These machines are used for precision chamfering, tooth rounding or polishing of gears and splines. Gears up to 13" in diameter can be handled on standard machines—larger on special.

S-225 MACHINING THE UNMACHINABLE

A 16-page booklet describing the techniques, advantages, uses and machines for ultrasonic machining of hard materials such as carbides, glasses, and ceramics.

S-233 ELECTRONIC LEAD MEASURING INSTRUMENT

A 4-page Engineering Data Sheet describing an Electronic Leadcheck which will handle work up to 36" between centers and a maximum diameter of 10". Standard remote Electronic Amplification, 2,000 to 1.

S-234 MEASURING INSTRUMENT

A 3-page Engineering Data Sheet covering Type N-6 Interchangeable used to inspect master and ring gages and standard and custom made. Standard range .370" to 12", with a vertical range up to 1 1/2". On special order, diameters down to .240" can be inspected.

S-235 DIMENSIONAL CONTROL AND GAGING POLICY

A 40-page booklet containing important information for inspection personnel on gages and gaging policy. It includes tolerances, unilateral and bilateral gages, and methods of inspection. Also included are diagrams and charts on Unified and American Standard Screw Threads.

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Dayton 1, Ohio, U. S. A.

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PARKER-KALON BUILDS NEW PLANT IN CLIFTON, NEW JERSEY

Parker-Kalon has announced the construction of a new plant located in the rapidly growing industrial city of Clifton, New Jersey. Only 20 minutes from Times Square, Clifton has the advantage of being a part of metropolitan New York. The nature of the manufacturing operations involved in the production of P-K fasteners dictated the one-story construction of the new plant. The total floor space is 267,000 square feet of which 225,000 square feet will be used exclusively for manufacturing. The new plant embodies the latest thinking in modernization and maintains a fairly high degree of automation. The entire plant has

been designed on a flexible basis and was constructed with knock-out type walls so that the manufacturing area can be readily expanded to 450,000 square feet. Raw material (primarily steel wire) flows from the storage area by conveyor through the various processing departments with a minimum of handling, terminating at the finished goods storage and shipping centers.

Three main types of materials handling equipment will be utilized in the new plant; namely, trucks, overhead mono rails and cranes and conveyors. Provisions have been made possible a completely new method of handling wire in 400-pound coils, which represents a complete billet as cast by the steel manufacturer. All wire will be stored in specially developed portable racks hold-



Wash drawing of new, modern Parker-Kalon plant located in Clifton, New Jersey

ing not over 4,000 pounds each. Shipping facilities utilize 40,000 square feet of space. Heat treating facilities include completely automatic furnaces and other equipment for hardening, tempering, annealing and baking. To assure accurate temperature control, a Marley twin atmospheric cooling tower has been installed on the roof, as well as fume washers and dust collectors. Waste trenches have been built into the floor of the heat-treating area.

The plating area has been built with special acid-proof china brick trenches and drains. Considerable attention has been devoted to washing and cleaning equipment so that plating will be done on surfaces that approach surgical standards for cleanliness. The plant inspection facilities have also been increased materially. In addition to the usual shop equipment and the facilities of the engineering department, the new plant incorporates a completely independent air-conditioned laboratory for research and development. This area is easily accessible from both the factory and the engineering department, yet is completely vi-

bration-isolated from both. Provisions have also been made so that a fire or explosion will be limited to small areas.

★ ★ ★

NIAGARA MACHINE & TOOL ELECTS FOUR NEW TOP OFFICERS

Four new top officers now head Niagara Machine & Tool Works, Buffalo, N. Y., as a result of a recent election by the board of directors. George E.

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STOPS DUST**



DUST COLLECTORS



37 STANDARD
MODELS



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news of the industry . . .

Munschauer has been elected chairman of the board and chief executive officer. He has been with Niagara since 1928, having served as treasurer and a director since 1941 and vice president and treasurer since 1945. He has been active in product engineering since



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(Top) George E. Munschauer (left) and Frederick E. Munschauer, Jr. (right). (Bottom) Franklin A. Reed (left) and Edwin A. Munschauer, Jr.

joining the company. Frederick E. Munschauer, Jr., the new president and general manager, succeeds his father, Frederick E. Munschauer, Sr., who died recently at 70 years of age. Mr. Munschauer, Jr., has been vice president in charge of manufacturing and industrial relations since 1953 and a director since 1947. He was appointed works manager in 1946. Mr. Mun-



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to Speed Up Production!***

HEIMANN TRANSFER SCREW SETS

Here is the faster, more precise way of transferring open and blind screw holes—make savings in "wage-dollars-per hour" of your expensive hands on every job. A die-and-tool maker's tool with many other applications for die makers and machinists. A set of 6 Hardened Screws nested in combination holder and wrench—no other tools needed. Get more work now—save money tool

IN 11 SIZES—No. 6 to 1" N.C. In all S.A.E. sizes.

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March 19-23

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Blue Ribbon Winners of 1956
The 453 selected
TOOLING CHAMPIONS
plus 27,898 runners-up

The best and latest in *tools, machines, inspection equipment, automation devices, controls and accessories to cut costs and boost profits—many never before shown anywhere.

For the small plant
For the intermediate plant
For the big plant

See them at ASTE's Greatest Show

Sponsored by the 32,000 men responsible for designing and selecting the best in production equipment. Write for advance registration blank today.

Equally important, plan to attend the 5-day, all-industry conference covering the latest developments in manufacturing techniques and equipment.

**1956 ASTE
INDUSTRIAL
EXPOSITION**
**International
Amphitheatre**
CHICAGO, ILLINOIS
MARCH 19-23, 1956

AMERICAN SOCIETY OF TOOL ENGINEERS
10700 Fortien
Detroit 38, Michigan

For more data circle 393 on Reader Service Card

news of the industry . . .

schauer, Jr., entered the employ of Niagara in 1939.

Franklin A. Reed, elected vice president in charge of sales, has been sales manager and a director of Niagara since 1945. He joined the company in 1924. Edwin A. Munschauer, Jr., is

Niagara's new treasurer and a new director. He was service manager of the company since 1941 and has been associated with the firm since 1936. Elmer D. Heinz has been re-elected secretary and a director. He has served continuously in both capacities since 1941.

In addition to all of the aforementioned officers, Edwin A. Munschauer, Sr., a director since 1918, and Seward H. Millener, local attorney and a director since 1946, are members of the board of directors.

★ ★ ★

**NILSSON GAGE ANNOUNCES
MIDWESTERN DIVISION**

The Nilsson Gage Co., Poughkeepsie, N. Y., has announced that the Threadco Company located at Berkley, Michigan, is now being operated as its midwestern division. The Berkley plant will add plain plug and ring gages to Nilsson's current line of thread gages for faster and more complete service to customers in the Midwest.

★ ★ ★

**ATRAX LAUNCHES EXTENSIVE
EXPANSION PROGRAM**

The Atrax Company, manufacturer of solid tungsten carbide tools, has launched an extensive expansion program at its Newington, Connecticut,

CAMS

MADE TO YOUR SPECIFICATIONS
—Except Screw Machine Cams—
Design Assistance Offered
KIDDE PRECISION TOOL CORP.
15 LOCUST AVENUE, ROSELAND, N. J.

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Model No. 4

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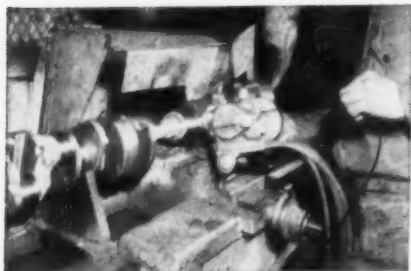
For All Lathes—Old or New—
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\$149.50**

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when mistakes happen...



Automotive crankshaft being brought up to inspection standards with metallizing. This automotive manufacturer formerly used plating for this type of salvage, worked one per hour. With metallizing, the salvage operation requires only 5 to 10 minutes per shaft, including surface preparation.



Free Bulletin

Get the full story on metallizing in production salvage. Bulletin 57-C describes and illustrates the procedures, provides data on typical parts, with interesting photo-micrographs showing the unique bonding action of Sprabond Wire. Send for a copy.



Metallizing Engineering Co., Inc.

1111 Prospect Ave., Westbury, L. I., New York • cable: METCO

In Great Britain: METALLIZING EQUIPMENT COMPANY, LTD.—Chobham near Woking, England

...and they do in any busy machine shop, there's no need to scrap a mis-machined or otherwise damaged machine part that represents an investment of many expensive man-hours. Parts like these are brought up to inspection standards quickly, easily and inexpensively with metallizing.

And with the new molybdenum metallizing wire, Sprabond, the only surface preparation required is cleaning. The molybdenum forms a molecular bond with the surface being rebuilt. Little heat is generated, eliminating any danger of warpage.

What's more—users have found that the extreme hardness of the molybdenum coating, and its microscopic porosity which provides superior lubricating characteristics, improve its “wear-ability” over ordinary bearing surfaces as much as 25 times. You haven't just salvaged a part—you've improved it.

The trade name, SPRABOND WIRE, is the property of Metallizing Engineering Co., Inc.

DON A. WATSON
METALLIZING ENGINEERING CO., INC.
1111 Prospect Ave., Westbury, Long Island, N. Y.

- ☐ Please send me Bulletin 57-C.
☐ Please have Metco Field Engineer call.

Name _____
Company _____
Street _____
City _____ Zone _____ State _____

For more data circle 397 on Reader Service Card

news of the industry . . .

plant. Both space and equipment are being added to enable the company to keep pace with the demand for its line of tools. A general enlargement of all production facilities is currently underway, and 2,000 square feet of additional plant area is now under construction. Atrax is also increasing its special service facilities and is design-

ing and building custom-made machinery for the production of solid tungsten carbide burs, reamers, drills and other carbide tools.

★ ★ ★

N.T.D.M.A. ELECTS OFFICERS AT TENTH ANNUAL CONVENTION

At its tenth annual convention held recently in Detroit, the National Tool & Die Manufacturers Association elect-

ed the following officers for 1955-56: president, Joseph N. Huser, president, B & H Specialty Co., Inc., Indianapolis, Ind.; first vice president, Herbert Harig, president, Harig Mfg. Corp., Chicago, Ill.; second vice president, Philip R. Marsilius, vice president, The Producto Machine Co., Bridgeport, Conn.; treasurer, Robert C. Renner, president, The East Dayton Tool & Die Co., Dayton, Ohio. Harold G. Murdock, vice president of Arrowsmith Tool & Die Corp., Los Angeles, Calif., was re-elected secretary. George S. Eaton continues as executive secretary, and Charles R. Bender as assistant secretary.



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precision
stamping**

with

KENCO

1½ to 15 ton
PUNCH PRESSES

Low cost because Kenco presses are quality-built throughout to produce at top speed, and with the least downtime you've ever experienced.

Precision stamping—a result of unusually rigid frames . . . extra long ram guides and slides that permit full use of the guiding area at the bottom of the stroke.

Send for full details on money-saving Kenco presses.

KENCO MANUFACTURING CO.

Mfrs. of Precision Machinery and Accessories.
5211-A TELEGRAPH ROAD, LOS ANGELES 22, CALIFORNIA

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New

SEIBERT TAP DRIVERS

PERMIT FASTER AND EASIER TOOL CHANGES IN CLOSE-CENTERS

★ Seibert now offers a new, improved adjustable Tap Driver, available in both Tension or Compression types, that is easier to work with in close-center jobs and provides added strength and rigidity to the nose of the float. With the new Seibert one-piece holder, taps are now held securely and accurately in place by a trepan clamp. This design feature permits faster and easier change of taps and eliminates the hex nut method of holding which is difficult to work with in close-center work and which, on occasion, will twist off the nose of the float if turned too tight. Elimination of the hex nut also permits greater clearance for tapping in counterbored holes.

PRECISION-BUILT TO MAINTAIN CLOSE TOLERANCES

Like all Seibert Production Holding Tools, these new Tap Drivers are precision-built from highest quality alloy steel, hardened and ground for perfect fit. Diameters are held to .0003", and total concentricity 6" from the nose is held to within .002" (total indicator reading).

ADDITIONAL DATA

Write today for Folio 2-50 illustrating and describing the complete line of Seibert Adapters and Tap Drivers.



View of new trepan method of holding that is easier to work with and provides greater clearance in close-center jobs.



Shur-Lock
Adapter
Bodies



Shur-Lock
Micro-Nuts



Spindle
Extension
Assemblies—
800 Series



Spindle
Extension
Assemblies—
900 Series



SEIBERT & SON, INC. CHENOA, ILLINOIS

Quality MULTIPLE DRILL SPINDLES AND PRODUCTION TOOLS

For more data circle 399 on Reader Service Card

news of the industry . . .



(Left to right) Herbert Harig, Robert C. Renner, Joseph N. Huser, Harold C. Murdock and Philip R. Marsilius

Outgoing president, Jerome H. Stanek, vice president of Stanek Tool and Mfg. Co., Milwaukee, Wis., received a plaque in recognition of "his out-

standing contributions to the industry and association on both national and local levels."

For the second straight year, The Cleveland Tool, Die and Machine Shops Association received the Grand Award for notable public relations achievements by a local group in the N.T.D.M.A. Public Relations Awards competition. An award of merit went to The Central Connecticut Tool and Die Industries.

★ ★ ★

EX-CELL-O ACQUIRES PLANT IN INDIANA AND BUILDING SITE IN CALIFORNIA

Ex-Cell-O Corp., Detroit, Mich., has announced the acquisition of additional facilities for manufacturing operations. A modern plant, having 66,000 square feet of floor space, has been purchased at Elwood, Indiana, which is be-

★ ★ ★ ★ ★

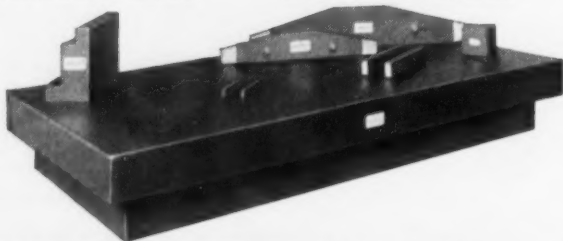
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surface plates and
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All sizes—
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**INCREASES
PRODUCTION...**

LOWERS COSTS...

**PAYS FOR ITSELF
QUICKLY...**

The ROUSE HAND MILLER is a widely used, inexpensive, high speed, ball bearing, motor driven machine for handling light cuts in brass, aluminum, steel, plastics, and other materials—fast, accurately, and at very low cost. Only \$110.00*

Fixtures (illustrated) extra.

Motor equipment:— $\frac{1}{2}$ H.P., 110 Volt AC 60 cycle, single phase, swivel motor mount and light—\$36.00*

* All prices FOB Chicago.



- ★ **MILLS SMALL PARTS MUCH FASTER.**
- ★ **DRASTICALLY CUTS YOUR INVESTMENT IN EQUIPMENT.** Replaces expensive production machinery—or releases it for other jobs.
- ★ **INEXPERIENCED HELP CAN OPERATE IT.** Safe, simple, fool-proof operation.
- ★ **NO MORE COSTLY SET-UP TIME.** \$110.00* price so low that it pays to keep one or more Hand Millers always set-up for special operations.
- ★ **YOU GET A BETTER PRODUCT**—the result of ABSOLUTE ACCURACY.
- ★ **A LOSS BECOMES A PROFIT** when marginal pieces are finished on the Hand Miller instead of on high cost equipment.
- ★ **VERY LOW MAINTENANCE.**
- ★ **USED REGULARLY IN 1163 MANUFACTURING PLANTS** (some of which use as many as 30 machines)—yet on the market a scant few years.
- ★ **UNIQUE—VERSATILE.** Nothing else like it. One or several machines can be the answer to some of *your* production problems.

**Write today
for further
information.**

H. B. ROUSE & COMPANY
2214 N. WAYNE AVE., CHICAGO 14
50 YEARS OF SERVICE TO INDUSTRY

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news of the industry . . .

tween Fort Wayne and Indianapolis. The building is located on an 11-acre plot having a railroad siding. The plant is being prepared for occupancy and operations in the near future. At Downey, California, a suburb of Los Angeles, Ex-Cell-O has acquired a 15-acre plant site. Plans are now being

made by the company for the erection of a 60,000 square foot manufacturing building on this site.

★ ★ ★

**WARNER & SWASEY CELEBRATES
75TH ANNIVERSARY**

When 3,000 Warner & Swasey employees, plus members of their families, gathered recently at an open house celebrating the company's 75th anniversary,

they found many yardsticks by which to measure this Cleveland pioneer turret lathe builder's progress since 1880. Not only had Warner & Swasey's sales multiplied over a hundredfold in the intervening three-quarters of a century—from \$349,000 that first year of business to nearly 40 million dollars in the current year—but the company's plant facilities and product line gave ample evidence of its growth.

From a small machine shop where Worcester R. Warner and Ambrose Swasey first produced their original turret lathes, Warner & Swasey has grown into a manufacturing facility

**FINEST
SEEING
TOOLS
EVER
DESIGNED**

Direct Light
Exactly as you
want it



Also
Available
with
one arm

**FOSTORIA
20th Anniversary
LOCALITES**

for Machine Tools, Assembly, Inspection

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\$897
Each

in std.
pkg. of 4
List \$10.55 ea.

MODEL 55-CX-701

NEW Universal Arm Joints—Bend 135°. Large frictional triple disc bearing surface. Smooth, easy movement. Instantly adjustable by hand to direct light exactly as needed.

NEW Collar Disc Joints—Rotate 180°. Combination of 135° bend joints and 180° rotating joints provides amazing articulation for positioning reflector.

NEW Reflector—Bell shape with 6 3/4" orifice. Accommodates 100 watt A-21 lamp. Available with lens.

NEW Base—Universal for horizontal or vertical mounting. Outlet box base optional.

NEW Wiring—Keyless porcelain socket and separate toggle switch. 8 ft. SPT-2 18/2 heavy duty plastic rip cord with molded plug.

NEW Finish—Semi-gloss Vista Green baked enamel. Reflector interior, high temperature White.

WRITE for Complete
Catalog of Localite
models for every
industrial use.



**THE FOSTORIA PRESSED STEEL
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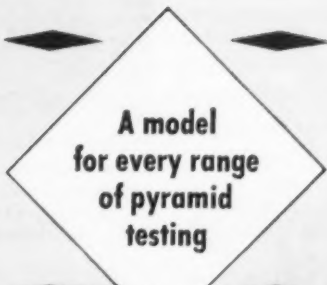
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Wilson "Tukon" Micro Hardness Testers



Model LR—Floor model
for Micro and
Macro Hardness testing



Model MO—Table model for
Micro Hardness testing only



Model FB—Floor model
for Micro Hardness
testing only

These "Tukon" models meet every fine test requirement

• WILSON "TUKON" Micro Hardness Testers are unexcelled for testing metallic and non-metallic parts where minute indentation and extreme accuracy are necessary. All use both Knoop and 136 degree Diamond Pyramid Indentor.

Selection of the model for your

requirement depends on the type and thickness of work to be tested, range of loads, other hardness testing equipment available and whether a combination of micro and macro hardness testing is required. Write for **Booklet DH-114** on WILSON "TUKON" Micro and Macro Hardness Testers.

ACCO



**Wilson Mechanical Instrument Division
AMERICAN CHAIN & CABLE**

230-G Park Avenue, New York 17, N. Y.

For more data circle #03 on Reader Service Card

January, 1956

modern machine shop 201



news of the industry . . .

covering many acres and incorporating several large plant structures. Its products, while still including a number of modern turret lathe models, now comprise automatic screw machines, precision tapping and threading machines, a great variety of tooling and machine at-



HOLD-ALL

THE MODERN HOLD DOWN UNIT
CAPACITY RANGE $\frac{1}{2}$ " TO $6\frac{3}{4}$ " HEIGHT.

Advantages: 1. Saves valuable set up time. 2. Will not mar or deface machine table. 3. Made of alloy steel, heat treated and black oxide finished, for life time service. 4. Tidy work areas, no need for shelves, blocking, bolts, shims, etc. 5. Ready for instant use. 6. Safer, no blocking to fall on tables, side of shapers, lathe face plates. Stays together when T-bolt is loosened. 7. Complete as shown \$24.50. Dealers wanted.



D.S.O. MFG. CO.

5 HARVARD STREET

NEW BRITAIN 22, CONN.

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Charles J. Stilwell (right), Warner & Swasey board chairman, presents framed 50-year employee service award scroll to Stephen Lawson at Warner and Swasey's 75th anniversary open house celebration.

tachments and precision inspection and measuring devices, as well as textile weaving machinery and earth-moving equipment.

In the plant demonstration room, visitors witnessed the operation of the company's entire line of machines as presented at the Machine Tool Show which was recently held in Chicago. A graphic contrast to these new machines was an old 1882 Warner & Swasey lathe which was also on display. A large circus-type tent erected adjacent to the plant offered ample seating capacity for a special entertainment program and the presentation of service awards to employee "old-timers," an event that was an important part of the celebration. The employee service awards,



Specialized Production, Lower Costs

Send us your drawings or specifications . . . ask for estimates on producing your cams on a contract basis. You'll be interested . . . in our speed and savings. (Right) Diesel Engine Cams produced by Rowbottom.



THE ROWBOTTOM MACHINE CO., Waterbury, Connecticut

Also Cam Milling and Cam Grinding Machines. Ask for details.

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Sesco

positive holding

CAM CLAMPS

**THEY MAINTAIN POSITIVE HOLDING
PRESSURE—NEVER LOOSEN . . .**

The effective clamping range solves the problem of variations in stock thickness up to $\frac{1}{4}$ " and eliminates troublesome readjustments.

LAST INDEFINITELY . . .

- because of heavy steel construction and precision assembly.
- singly, or in multiple, on any machine tool, or operation.
- and withstands severe vibrations, even on milling operations.

**AND, THEY'RE
AVAILABLE FROM
STOCK IN 4 STANDARD SIZES . . .**

- with maximum holding pressure up to 1600 lbs.
- and, 2 larger sizes are available on special order—
with holding pressure up to 8000 lbs.

Patent No.
2,537,594



Sesco INC.

8881 Central
Detroit 4, Michigan

engineers & manufacturers
of machine tools and
press room equipment

For more data circle 406 on Reader Service Card

January, 1956

modern machine shop 203

news of the industry . . .

which were presented by Charles J. Stilwell, Warner & Swasey board chairman, included a specially-framed scroll for Stephen Lawson, a 50-year employee, and gold watches for nine 25-year men. The 50-year award was particularly significant, for with the company's modern retirement-pension

plan, it is considered unlikely that new employees will ever be retained past the age of 65 years.

★ ★ ★

KENNAMETAL ACQUIRES PLANT IN WILLOUGHBY, OHIO

Kennametal Inc., Latrobe, Pa., has announced the acquisition of all outstanding stock of the T. R. Almond

Mfg. Co., Willoughby, Ohio. About a year ago, the latter firm purchased the name, goodwill, trademarks and certain physical assets of the T. R. Almond Manufacturing Company of Ashburnham, Massachusetts, manufacturer of drill chucks. Officials of Kennametal stated that the Ohio firm was acquired primarily to provide additional facilities for the manufacture of the company's Kindex, Kennamatic and other mechanically-held types of metalcutting tools.

The new facilities include a modern, single-story plant on a three-acre site in a rapidly growing industrial section of Willoughby. Work has already



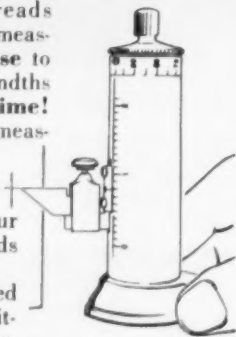
with GREIST MICRO-HEIGHT® GAGE

Precision-built Micro-Height reads faster than your micrometer! It measures height direct from zero at base to 3". Hundredths on barrel...thousandths on large head that cuts reading time! Attach your dial indicator for quick measuring between holes, surfaces!

CUT LAYOUT TIME!

Micro-Height also scribes like your vernier height gauge. Riser extends range to 9".

Precision-built, satin-chrome finished Micro-Height Gage quickly pays for itself! **Write for circular with prices.**



THE **GREIST** MANUFACTURING CO., 491 BLAKE ST., NEW HAVEN 15, CONN.
Precision Products since 1871.

For more data circle 407 on Reader Service Card

STANOIL Industrial Oil delivers on tough assignment at Indianapolis Screw Products Corp.



Mr. R. W. Williams, Plant Superintendent checks pitch diameter of thread with Glenn Riggs, Standard lubrication specialist. Glenn Riggs is an old hand at helping industrial firms work out lubrication problems. Glenn has been doing this sort of thing for 28 of the 30 years he's been with Standard. This background and experience, customers have found, pay off for them.

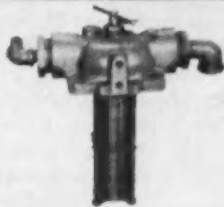


STANDARD OIL COMPANY (Indiana)

Rolling threads on aluminum bronze with pitch diameter tolerances as close as .0014" is a tough job but Indianapolis Screw Products Corporation is used to taking on such jobs and delivering. They give tough jobs to the hydraulic oil they use, too, and they expect it to deliver. They've given such a job to STANOIL and they're getting the results they expect—and more.

STANOIL Industrial Oil is used in the hydraulic system of a Watson-Flagg precision thread roller in the Indianapolis Screw Products Corporation plant. The hydraulic system filter has not been cleaned in over a year *because it hasn't needed cleaning*. Here, as in other applications, STANOIL delivers top performance with minimum maintenance and maximum system cleanliness.

PERHAPS you would like to know about the use of STANOIL in a hydraulic application in your plant. In the Midwest and Rocky Mountain states, a lubrication specialist at your nearby Standard Oil office will be happy to discuss it with you. Call him. Or contact Standard Oil Company, 910 South Michigan Avenue, Chicago 80, Illinois.



Cuno filter in Watson-Flagg Thread Roll machine has been filtering STANOIL more than a year. Filter remains clean.

been started to convert this plant for the new manufacturing operations. It is expected that volume production will get under way at an early date and will provide employment for approximately 75 persons. Mark A. Rollinson, who has been a member of Kennametal's Detroit sales organization, will be manager of the new plant.

YESTERDAY'S PIONEER . . . TODAY'S LEADER

NEW!



WELDON

AXIAL RELIEVING FIXTURE

● This fixture lends itself to the sharpening of end relieved cutting tools—often referred to as tools with axial relief. The longitudinal movement of the spindle is created by a cam which is mounted on the spindle.

This fixture is especially adapted to the sharpening of Weldon single cutting edge countersinks and deburring tools.

Write for complete details.

*Weldon distributors throughout U.S.A. and Canada
carry complete stocks to serve you.*

THE WELDON TOOL COMPANY



3000 WOODHILL ROAD . . . CLEVELAND 4, OHIO

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CONTOUR MACHINING CONFERENCE

Considered one of the most unusual industry events in the past few years, a Contour Machining Conference was sponsored recently by True-Trace Corporation, headed by George F. Fry, Jr., president, and Roy Rosebrook, chief engineer, at the True-Trace plant at El Monte, California. To fill an educational need in this newer segment

of metal cutting. True-Trace received the cooperation of Consolidated Vultee Aircraft Company, Douglas Aircraft Company, Consolidated Engineering Corporation, Farnham Manufacturing Division of Wiesner-Rapp Mfg. Corporation, North American Aviation, Incorporated, and Northrup Aircraft, Incorporated. The all-day conference included the showing of technical motion pictures, speeches and



George F. Fry, Jr.



PRESS-RITE

*Cuts "Per-Unit" Cost
Increases Die Life*

**3 Shifts a Day
Seven Days a Week
that's the year 'round
schedule at
Tonka Toys**

True-to-life truck bodies are made of 20 gauge steel drawn to a depth of $2\frac{3}{4}$ inches.

Chassis, cabs, wheels, etc., are turned out by the thousands at Tonka Toys... and each one has to be perfect to pass the critical inspection of today's boys and girls.

Press-Rite Presses do the job better
Increased Die Life... the experience of Tonka Toys proves that Press-Rite's tie rod frame design gives rigidity that really pays off in reducing costly die wear. You get longer runs between die grinds and keep dies at peak efficiency. The Press-Rite Airflex Clutch protects dies against accidental breakage as air-pressure is adjusted for-the-job and allows the clutch to slip on "double headers"

ALL-OUT PRODUCTION at the TONKA TOYS Factory

Mound Metalcraft Company, the home of Tonka Toys, is now one of America's leading toy manufacturers. Their rapid growth is symbolized by their "repeat orders" year after year for additional Press-Rite Presses.

Press-Rite Presses... that's the combination that the folks at Tonka
... Airflex Clutches... Toys have found gives them the highest production... at the lowest cost per unit.

PRESS-RITE has many exclusive features to make it today's TOP PRESS VALUE. Send for Catalog Today—get the money-saving facts on the Press-Rite Line. Speed Production and Cut Costs in your plant.

SALES SERVICE MACHINE TOOL CO.

2355 University Ave., St. Paul 14, Minn.

PRESS-RITE

OPEN BACK • INCLINABLE Power Presses
Used by more... for more production

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January, 1956

modern machine shop 207

panel discussions. The objectives of the conference were focused on the radical changes in aircraft and instrument fabrication required in the last four years.

True-Trace sponsored the first annual Contour Machining Conference so that the forward-thinking speakers and

panel members could make further, distinct contributions to the metalcutting industry.

★ ★ ★

MORSE TWIST DRILL CHANGES ORGANIZATIONAL SETUP

Changes in the organizational setup of executive leadership of Morse Twist Drill and Machine Company and other Van Norman affiliates have been announced by James

Y. Scott, president of Morse. Chief officers of Morse are Mr. Scott, chairman of the board; Charles F. Myers, president; J. J. Hayes, executive vice president and general manager. Mr. Myers was formerly vice president of sales.

Directors of Van Norman Company recently voted to change the name of the company to Van Norman Industries, Incorporated. Operating under Norman In-



Charles F. Myers



Check your SIZE CONTROL

Bring your inspection problems to us. Use our laboratory facilities . . . skilled personnel . . . precision metrology equipment—temperature controlled to Bureau of Standards specifications.

CHECK YOUR

<input checked="" type="checkbox"/> PRECISION GAGE dimensions	<input checked="" type="checkbox"/> HARDNESS—Tukon, Rockwell, Superficial
<input checked="" type="checkbox"/> PIECE PART dimensions	<input checked="" type="checkbox"/> MAGNAFLUX
<input checked="" type="checkbox"/> DIE, JIG & FIXTURE dimensions	<input checked="" type="checkbox"/> MOLDS and MOLDED PARTS - all dimensions
<input checked="" type="checkbox"/> SURFACE FINISH in micro-inches	<input checked="" type="checkbox"/> STROBOSCOPIC readings on MOVING PARTS
<input checked="" type="checkbox"/> Inspect, repair, SET & SEAL Thread Rings	<input checked="" type="checkbox"/> PLATING Thickness
<input checked="" type="checkbox"/> Hard-to-measure parts OPTICALLY	<input checked="" type="checkbox"/> TUBE SOCKET Insertion & Extraction Pressures

THE MIDWEST GAGE LABORATORY

2500 W. WASHINGTON BLVD., CHICAGO 12, MO 6-6710

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PERFECT FOR INTERNAL HOLES
AND IRREGULAR DIES



REACHES "INACCESSIBLE"
PLACES — THE FINEST DETAILS



TO FINISH IRREGULAR
AND CURVED SURFACES—
ALSO SHOULDERS AND RECESSES

Di-Profiler

RECIPROCATING
HAND MACHINE



A rapid, accurate, easy-to-operate tool that saves costly hours on dies, molds and precision parts. Indispensable for filing, scraping, lapping and polishing operations involving flat or curved surfaces. Intricate details are finished in a fraction of normal time.

The Di-Profiler has a stroke adaptable from 0 to 6 mm. ($\frac{1}{4}$ "); reciprocation can be varied from 0 to 100 strokes per second.

Accessories include steel and diamond files, diamond discs, laps, T-C scrapers, and other tools.

For complete details, write Dept. DS-16

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431 S. DEARBORN ST. • CHICAGO 5, ILL.

Special products for finishing

HYPREZ DIAMOND COMPOUNDS

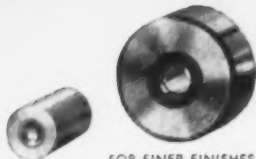


For all finishing jobs, from roughing to mirror polish, Hyprez, the original Diamond Compounds, have world-wide acceptance for their superior quality and results.

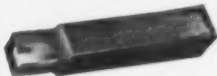
The exclusive Hyprez vehicle, exactly graded diamond particles, rigid control of quality, all guarantee that Hyprez will do your finishing job best. Available in 18- and 3-gram sealed cartridges for use with the Hyprez Applicator Gun.



For complete details, write Dept. HS-16



FOR FINER FINISHES
FASTER ON DIES



ASSURES LONGER TOOL LIFE,
GREATER PRODUCTION



COST SAVINGS FOR MOLDS
AND HOBS

news of the industry . . .

dustries, Incorporated, will be the Van Norman Machine Co., Springfield, with Charles R. Crowder as president; the Van Norman Automotive Equipment Co., Springfield, with Selby Greer as president; Morse Twist Drill and Machine Co., New Bedford, with Mr. Myers as president; Super Tool Co., Detroit, with Gordon

Birgbauer as president; and Insuline Corp., Manchester, N. H., with S. J. Spector as president. Mr. Scott will be chairman of the board of all of these companies.

★ ★ ★

**LANDIS MACHINE COMPANY
ERECTS NEW ADDITION**

Landis Machine Co., Waynesboro, Pa., has announced plans for the erection of an addition to its present tap division building.

This addition will house the research department and the newly-created thread roll die department, together with office facilities for these departments. It is to contain 11,250 square feet of floor space and will extend the present 90-foot wide tap division building 125 feet eastward. According to the manufacturer, the acceptance of the "Lanhyrol" thread rolling machine and the "Lanroll" attachment by the metalworking industry has made present facilities for the production of thread rolling dies totally inadequate. The new addition will make it possible to con-

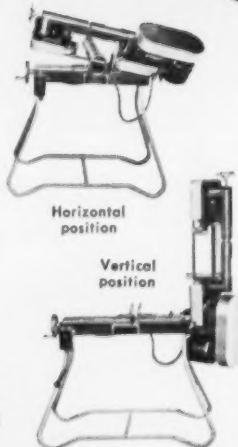
NOW → **YOU CAN HANDLE
METAL CUT-OFF or
LIGHT CONTOUR CUTTING**

**... with one
economically
priced saw ...**

Here's unmatched versatility in a quality built, dual-purpose band saw — the Wells 49-A. TWO saws for the price of ONE!

Use it as an efficient, money-saving horizontal cut-off saw to handle jobs up to $3\frac{1}{2}$ " x 6". Then, with one easy motion, convert it to a vertical band saw. Just swing head into upright position — it's ready to use. No tools required! It's handy for cutting angles and slots, and for light contour work.

The Wells 49-A is a real time and money saver in any shop or experimental lab. Write for full details or call your local Wells Distributor.

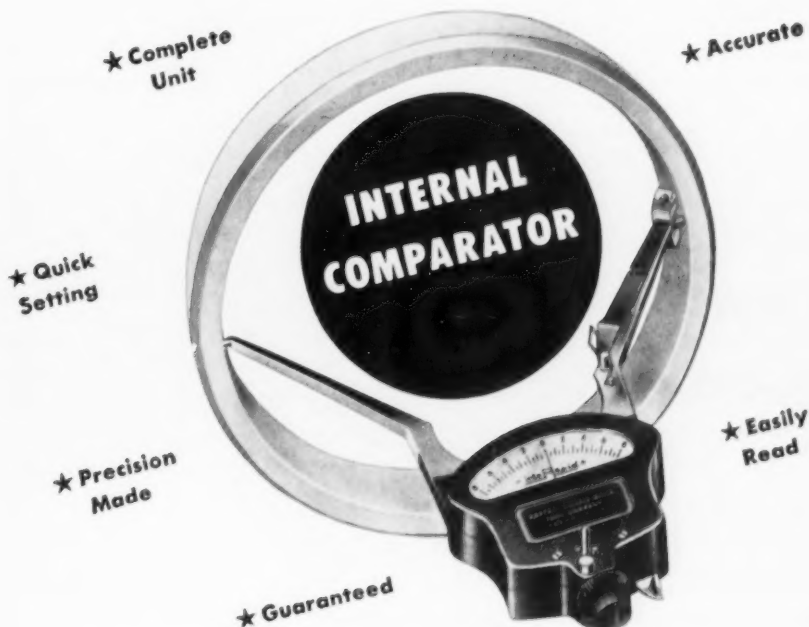


The Pioneers of Horizontal
**METAL CUTTING
BAND SAWS**

WELLS MANUFACTURING CORPORATION
808 TYLER ST. THREE RIVERS, MICH.

For more data circle 413 on Reader Service Card

NEW "Inte Rapid"



New Internal Comparator Gage has gaging capacity from $\frac{3}{8}$ " diameter to 6" diameter. Meter-type scale, graduated in .0005", shows at a glance whether holes are oversize or undersize and by exactly how much.

Gage is designed for use on Jig Bores, Boring Machines, Internal Grinders, Lathes and for all Inspection Personnel.

For complete details . . . write for Comparator Specification sheet.



PORTAGE Double-Quick TOOL CO.

1041 Sweitzer Avenue • Akron 11, Ohio

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news of the industry . . .

centrate into one department, both engineering and production facilities.

The present research department is located on the ground floor of the main office building. The relocation of this department will enable an extensive expansion of the research and experimental activities of the company. The tap division building, to which the addition is being made, was only recently

constructed. It contains 21,008 square feet of floor space. The new addition, like the present tap building, will be of steel, brick, transite, glass block, and non-combustible construction.

★ ★ ★

VAN NORMAN ACQUIRES SECOND ELECTRONICS COMPANY

A second acquisition in the electronics field has been announced by Van Norman Company, as a part of its recently announced expansion and diver-

sification program. A contract has been signed for the acquisition of all of the outstanding capital stock of Transi-tron, Incorporated, manufacturer of electronic components and assemblies, to be paid for in Van Norman common stock. The company, which will be operated as a wholly-owned subsidiary of Van Norman, currently operates two plants in New York City; however, present plans call for moving to Manchester, New Hampshire, where plant space of approximately 100,000 square feet will be available. The entire engineering staff of Transi-tron is being retained and will move with the opera-

New!
Incomparable!

dyna-trol

ELECTRIC FURNACES

COMPARE THESE FEATURES

- Infinite Zone Control to 2000° and 2300°F
- Zone temperature indication by Pyrometer Selector Switch
- Porcelain Element Holders
- Automatic Hold and Cut-off instrument available
- Infinite Variety of Time-Temperature Curves Obtainable
- Rugged Construction. Highest quality insulation used.

COMPARE THESE PRICES

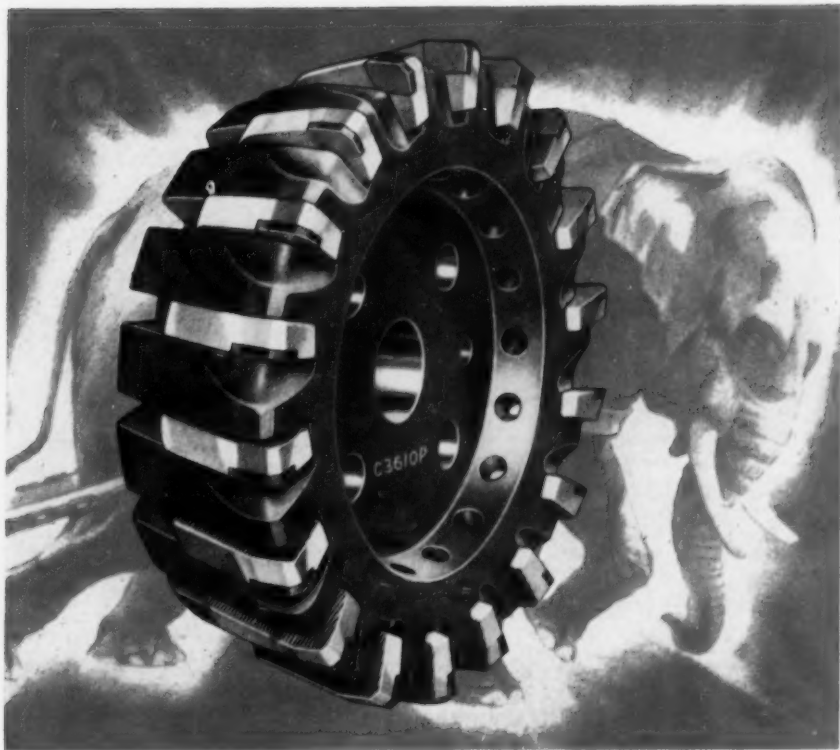
Firing chamber (H. W. D.)	Semi-Auto. prices	Auto. prices
6"x12"x12"	\$295.	\$432.
12"x12"x12"	\$405.	\$550.
9"x 9"x18"	\$480.	\$625.
14"x14"x14"	\$525.	\$680.
20"x20"x20"	\$975.	\$1140.
18"x18"x36"	\$1125.	\$1375.
(To 2000° Maximum Temp.)		

Over 40 Standard Models — Write for complete literature

L & L

**INDUSTRIAL DIVISION
MANUFACTURING CO.
CHESTER 71, PA.**

For more data circle 415 on Reader Service Card



Pull...like a bull elephant

OK DUAL ADJUSTMENT milling cutters, size for size, are the huskiest produced. In simplicity lies their great strength. There are just two parts — body and blades . . . uncomplicated or weakened by cut-outs or recesses for locks, pins, gibs or gadgets. Bodies are drop-forged, with slots positioned to micrometer dimensions. Blades are available in high speed, alloys or carbide.

The drive-fit insures a secure seat. Mating

serrations prevent blade movement except for advancement to compensate for wear. This simple construction permits the use of more blades in the fine pitch series and heavier blades in the coarse pitch series. OK cutters convert the full horsepower available without losing a kick, remove the maximum amount of metal — measured in speed, feed, chips, minutes, power consumption or man hours. Do you have a copy of the OK catalog 13?



OK

**modern milling cutters
for modern milling machines**

THE OK TOOL COMPANY, INC., Milford, New Hampshire

For more data circle 416 on Reader Service Card

news of the industry . . .

tion to Manchester, thereby facilitating cooperation with the engineering staff of Insuline Corporation of America, the other electronics company recently acquired by Van Norman.

Transitron produces electronic in-

strumentations, both for the military and civilian markets, with its military products also having definite application in the commercial, industrial and color television fields. Management of the new subsidiary will consist of Samuel Lackoff, president, and Samuel J. Spector, vice president, who will act as directors with J. Y. Scott, chairman of the board of Van Norman; Herbert I. Segal, chairman of the executive committee of Van Norman who will also hold this position with Transitron; and R. W. Porter, treasurer of Van Norman and also of the new subsidiary.

★ ★ ★

THOR PURCHASES CINCINNATI RUBBER MANUFACTURING COMPANY

Thor Power Tool Co., Aurora, Ill., manufacturer of portable air and electric power tools, has announced the acquisition of the assets of the Cincinnati Rubber Mfg. Co., Cincinnati, Ohio. Cincinnati Rubber manufactures transmission and conveyor belting, hose, rubber roll covers, packings, gaskets, tubing and associated mechanical rubber products. Neil C. Hurley, Jr., Thor president, stated that under the purchase agreement Thor will pay over \$1,600,000 for all of the Cincinnati assets, including inventory, machinery, buildings, name and good will.

Extra Capacity with
hall COLLET CHUCKS

**for
SPEED,
ACCURACY,
ECONOMY**



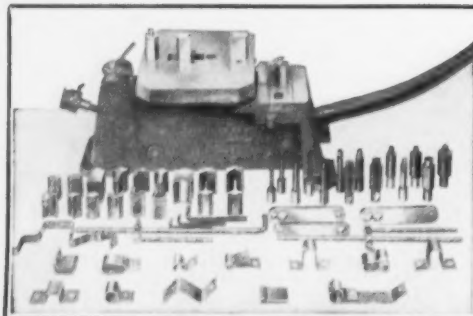
Automatic adjustment speeds up production in multiple operations with push-out type HALL COLLET CHUCKS. Full spindle capacity or over. Tremendous grip over or under stock size. Without adjustments. Shortest overhang. All grip ... no slip. No bearings ... no heat or lost power. Instant release without stopping lathe. **SATISFACTION GUARANTEED!**

Made in Three Sizes to Fit Your Requirements:
 Model A...1" (max. capacity 1-1/16")
 Model B...2" (max. capacity 2-1/16")
 Model C...3" (max. capacity 3 3/4")

Write today for illustrated catalog and price list - Dept. B. I.

HALL MANUFACTURING COMPANY
422 TULAROSA DRIVE, LOS ANGELES 26, CALIFORNIA

For more data circle 417 on Reader Service Card



Multiform BENDER CUTTER

Users report the Multiform Bender one of the handiest tools in the shop. No special tooling . . . Bends, Cuts, Punches, Flats, Rounds into Any Shape. Clamps, Brackets, Springs, Busbars, Wire Forms, Aircraft Work, Steel Rule Dies, Etc.

AIR OR HAND MODELS FOR UP TO 1/4" to 4" MATERIAL

Write for brochure which illustrates and describes the four bender models.

J. A. RICHARDS CO.

Dept. 6-M

Kalamazoo, Mich.

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**True Economy in Thread Gaging
Calls For**

Lincoln Park

**CARBIDE
THREAD PLUG
GAGES**



The largest gage illustrated is a carbide buttress thread plug gage of $5\frac{1}{2}$ " diameter—12 pitch. It serves as a good example of Lincoln Park's ability to meet special thread gaging requirements. Or, when customers' needs are for standard carbide thread gages, Lincoln Park offers a complete range of types and sizes.

The manufacture of thread plug gages has been a Lincoln Park specialty for many years. In fact, this company was the first to successfully utilize cemented-carbides for such products. It is this unequalled experience that assures you of gages of unquestioned accuracy and maximum service life.

Let us send you full information on Lincoln Park thread plug gages produced in carbide—or in steel.



THE PLUS IN PRECISION

Lincoln Park

INDUSTRIES, INC.

1719 FERRIS AVENUE • LINCOLN PARK 25, MICHIGAN

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news of the industry . . .

Cincinnati Rubber has been producing mechanical rubber goods since 1905. No changes in management or operations are contemplated, except that J. F. Joseph, president of the Cincinnati firm since 1934, will become chairman of the board, and L. P. Darnall, vice president and general man-

ager since 1946, will move to the presidency. Both men will remain active in the business.

★ ★ ★

GEORGE GORTON, SR.

American industry lost a pioneer machine tool designer and industrialist recently when George Gorton, Sr., president of Gorton Machine Co., Racine, Wis., died at his home at 90 years

of age. Mr. Gorton died where he had spent almost all his life, within a stone's throw of the site of the company he started 67 years ago in a shed at the rear of the Gorton home on Thirtieth Street. Although active operations of the company had been turned over to his three sons (George III, executive vice president and general manager; Charles, vice president of manufacturing; and James,

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Color Identified for Positive Use

Use Any Standard Finishing, Polishing or Lapping Technique

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ABRASIVES DIVISION
ELGIN NATIONAL WATCH COMPANY
Dept. P
ELGIN, ILL.



George Gorton, Sr.

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standard for comparison
...and with high speed steels
the standard is REX

Living up to a standard for comparison isn't easy. That's why Crucible lavishes special care on the manufacture of REX® high speed steels . . . to keep REX the *standard* wherever high speed steels are used—as it has been for over half a century.

It's easy to *prove* the superiority of REX. Use it on the job . . . check its size, structure, response to heat treatment, fine tool performance. You'll agree with thousands of other users—you *can't find a high speed steel to outperform REX.*

Remember, REX is made only by Crucible. So call for REX at any Crucible warehouse, or for quick mill delivery. *Crucible Steel Company of America, Henry W. Oliver Building, Pittsburgh 30, Pa.*

CRUCIBLE

first name in special purpose steels

Crucible Steel Company of America

For more data circle 421 on Reader Service Card

**REDUCE THREAD CUTTING COSTS
WITH NEW "ST" THREADING
TOOLS**



**Precision
ground
cutters**



Any Standard or Special Thread Form can be cut more precisely and economically with type "ST" Threading Tools.

We supply longlife super HSS cutter blades precision ground to any thread form. To resharpen these cutters only grind top face.

Type "ST" Spring and Swivel Threading Tool holders come in 4 sizes to fit any standard toolpost. This is the most dependable Toolholder for cutting a smooth Precision Thread and for easy adjustment of angle of lead.

We also carry a full line of internal threading tools.

Write for free catalog to:

R.B.TOOL CO., Inc.

785 North Broadway
White Plains, N. Y.

news of the industry . . .

of San Marino, California, also a vice president), the senior Gorton continued to make daily trips to the office until just a few months ago.

During Mr. Gorton's life he saw his struggling machine shop grow into an internationally recognized leader in precision machine tool manufacture. Perhaps the most famous product, the Gorton pantograph, is a standard of comparison in the field of ultra-precision machine tools. That preciseness was dramatized by the firm's engraving the Lord's Prayer on a pin point.

★ ★ ★

**W. C. OLSON ELECTED
EXECUTIVE VICE PRESIDENT
OF BESLY-WELLES**

Warren C. Olson has been recently elected executive vice president by the board of directors of the Besly-Welles Corp., Beloit, Wis. The firm manufactures large production disc grinders, abrasives and a complete line of machinist's cutting tools. At the same election, E. Kenneth Welles, Jr., was named secretary of the company, filling the vacancy left by Mr. Olson's promotion from secretary to executive vice president. Mr. Welles will continue as advertising and sales promotion manager of the firm.

★ ★ ★

**A. E. NORTH RETIRES AS
SECRETARY AND TREASURER
OF BULLARD**

Announcement of the retirement of Arthur E. North as secretary and treasurer of The Bullard Co., Bridgeport, Conn., has been announced by E. C. Bullard, president and general manager of the company. At the same time,

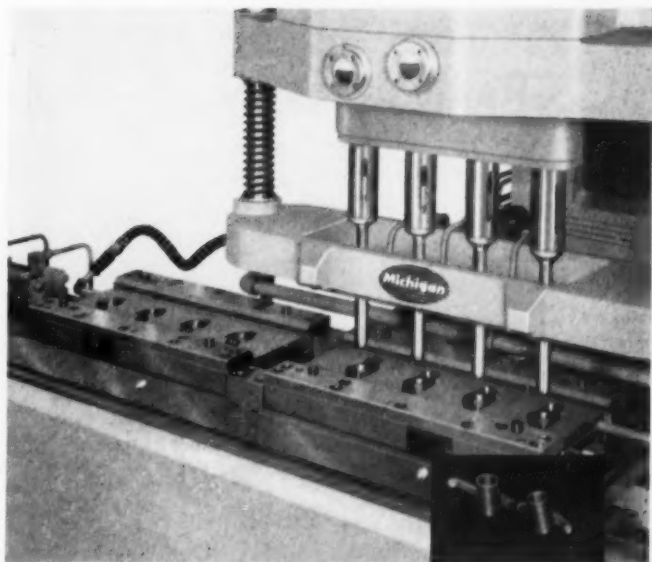
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Finish reams **1200** rocker arms per hour



Most Important

NO FURTHER
SUPER
FINISHING
OF THE
ROCKER
ARM
SHAFT
HOLE IS
NECESSARY



It's a 2-station Automatic Shuttle Fixture mounted on our Standard Hydro 5 Drill Press. Interchangeable nesting plates, for any size or shape rocker arm, will fit this machine.



We also invite your inquiries as to our line of tapping units, and index tables—both manual and automatic—catalog sent on request.

DRILL HEAD CO. Detroit 34, Michigan
engineers and manufacturers of production machines and drilling equipment

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Mr. Bullard announced that Francis L. Dabney will succeed Mr. North as secretary and treasurer, being elevated from the post of assistant secretary and assistant treasurer which he has held since November, 1953, when he joined the company. Mr. Dabney was elected

to the board of directors in June, 1955. Mr. North has served with Bullard since 1917.

★ ★ ★

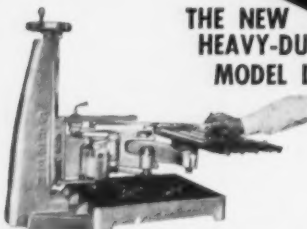
FARREL-BIRMINGHAM ACQUIRES WATSON-STILLMAN HYDRAULIC PRESS LINE

With the purchase of the business of the press division of The Watson-Stillman Co., Division of H. K. Porter Co., Inc., Roselle, N. J., Farrel-Birmingham Co., Inc., Ansonia, Conn., has acquired the patterns and drawings of this company's long-established line of press equipment. The purchase included engineering and sales divisions, patents, drawings, jigs and fixtures for all Watson-Stillman presses, but did not include any portion of the plant at Roselle, where Watson-Stillman will continue the manufacture of other products.

Farrel-Birmingham operates extensive manufacturing facilities in four plants at Ansonia and Derby, Conn., and Buffalo and Rochester, N. Y. By this purchase, Farrel-Birmingham

unique in design —
rugged in construction

GREEN PANTOGRAPH ENGRAVERS



**THE NEW
HEAVY-DUTY
MODEL D-2**

The Model D-2 two dimensional heavy-duty Pantograph is a precision machine with a multitude of new features. Open on three sides, it permits complete freedom for engraving, milling, profiling large panels (up to 30" in diameter) or bulky pieces. Single, micrometer adjustment controls vertical depth of cut, automatically adjusting copy table with pantograph. Range of reduction ratios from 2-to-1 to infinity! Vertical range over 10 inches!

For complete information, write to

GREEN INSTRUMENT COMPANY
392 Putnam Ave. Cambridge, Mass.

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Magnaflux Inspection



ensures **CIRCLE R QUALITY**

We specialize in the finest saws and other circular metal cutting tools. Quality is controlled and cost is lowered with scientific Magnaflux Inspection. This method reduces to minimum the occurrence of flaws in our product. For us, it identifies rejects before they reach the costly finishing stages. For you, it eliminates much of the usual down time due to defects. Refer to Catalog N for the complete line of Circle R cutting tools for automation and standard production.

Precision cutting tools for automation and standard production

Consult CIRCLE R Specialists in —

Burbank
Chicago
Cleveland
Dayton
Detroit

Hackensack
Indianapolis
Kansas City
Milwaukee

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Philadelphia
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METAL SLITTING SAWS
COPPER SLITTING SAWS
SCREW SLOTTING SAWS
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CUT OFF SAWS • CIRCULAR
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TUNGSTEN CARBIDE SAWS
COMBINED DRILLS & COUNT-
ERSINKS • CENTER REAMERS



CIRCULAR TOOL CO., INC.

PROVIDENCE 5, RHODE ISLAND

Specialists in Circular Cutting Tools Since 1923

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news of the industry . . .

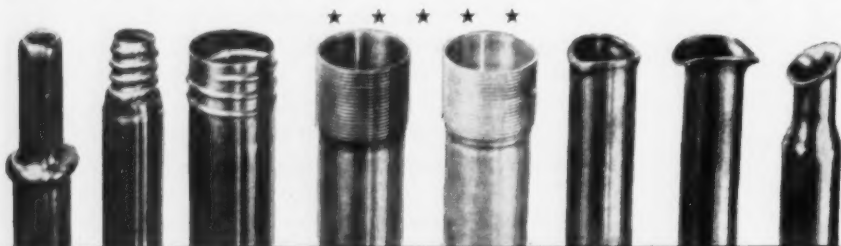


Illustration showing plant of Specialty Design Company located in Newtown, Ohio

ham rounds out its lines of processing machinery with the addition of presses of proven design and reputation. Farrel-Birmingham plans to continue the Roselle engineering and sales activity.

SPECIALTY DESIGN COMPANY CONSTRUCTS NEW ADDITION

The Specialty Design Co., Newtown, Ohio, has announced the construction



Jobs like these and many others are handled on VAILL TUBE-END FORMING MACHINES

**BEADING
FLARING
EXPANDING**

**REDUCING
SINKING
SWAGING**

**GROOVING
DOUBLE LAP FLARING
FLANGING**

These operations are performed on Vaill Machines on all materials from $\frac{1}{8}$ " to 6" diameter; available for single or multiple operation work . . . air, hydraulic and mechanical operated.

Send for General Bulletin G-3; outline your problems.



THE VAILL ENGINEERING COMPANY

133 E. MAIN STREET

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3

important reasons why you
should use STAR "Moly"[®]
High Speed Steel Blades

- 1 They outlast standard steel blades 10 to 1!
- 2 They assure high speed cutting performance second to none.
- 3 They are substantially lower in cost than any other type high speed steel blades!

Star was the first to successfully use molybdenum to make "Moly"[®] High Speed Steel Blades that would be tough, carry the load, retain sharpness and embody all the other high qualities and properties of heavy-duty blades.

Order "Moly" High Speed Steel Blades from your Industrial Distributor. Rely on him for *all* your metal-cutting needs. Remember, he carries the complete line of STAR Hand and Power Hacksaws, Metal and Wood Cutting Band Saws and Hacksaw Frames.

FREE

Ask your Industrial Distributor for a supply of
our NEW Metal Cutting Booklets and Wall Charts.

Sold Only Through Recognized Distributors



CLEMSON

CLEMSON BROS., Inc.

MIDDLETOWN, N. Y., U. S. A.

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Makers of Hand and Power Hacksaw Blades, Frames, Metal and
Wood Cutting Band Saw Blades and Clemson Lawn Mowers.

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WASHERS
SHORT RUNS . . .
LARGE RUNS . . .
Flat, Concentric,
Burr-Free . . .

FAST DELIVERY . . .

from this medium-size Detroit stamping plant.

For value and service, Whitehead is your source. Any metal—any special material. Whitehead has dies on hand for O.D. sizes $\frac{1}{8}$ " to 18"; any I.D. you want; any thickness from .002" to $\frac{3}{8}$ ".

In stock: S.A.E. standard light, medium, and heavy steel washers; brass and copper, small and large patterns; bolt sizes.

Get this catalog for your files by writing Whitehead at Detroit.

55-4



**WHITEHEAD
 STAMPING CO.**

**1673 W. LAFAYETTE BLVD.
 DETROIT 16, MICHIGAN**

For more data circle 428 on Reader Service Card

224 modern machine shop

news of the industry . . .

of a new addition which will enable the firm to provide complete service in the field of sales and service of new and used induction heating equipment. Specialty Design is believed to be the only company in the country which specializes in the reconditioning of induction heating equipment. Its services include coil and fixture design and manufacture, consulting service and automation of induction heating applications. Robert W. Miller, who spent 15 years in sales and engineering with TOCCO Division, Ohio Crankshaft Company, is president of Specialty Design Company.

★ ★ ★

CRUCIBLE STEEL ELECTS TWO VICE PRESIDENTS

The board of directors of Crucible Steel Company of America has elected James D. Glenn vice president of sales and Maurice J. Day vice president of research and development. Mr. Glenn was formerly general manager of sales for Crucible. Dr. Day has been the company's director of research and development. Both men will continue to maintain offices at Crucible headquarters in the Oliver Building, Pittsburgh, Pennsylvania.

★ ★ ★

H. K. PORTER PURCHASES TWO MANUFACTURING CONCERNS

The business of Henry Disston & Sons, Incorporated, has been acquired by H. K. Porter Co., Inc., Pittsburgh, Pa., in exchange for \$6,000,000 of its new $4\frac{1}{2}$ per cent preferred stock. Porter has also purchased the Monrovia, California, concern of Carlson & Sullivan, Incorporated, manufacturer of steel rules and measure.

January, 1956

Memo that kept a production line running!

MEMO:

TO: Production — Bill H.
FROM: Purchasing

Bill — Regarding that Carbide drilling + reaming problem you called about — I've checked carefully and am calling in a Chicago Latrobe service engineer. I understand they are top trouble shooters on this kind of job.

*Good you've called
the right man J.R.
Bill H.*

Chicago-Latrobe makes carbide drills and reamers of a quality that is unsurpassed — in a complete line — and backs these tools with the kind of service that keeps the production line running. Try them and see.

Chicago-Latrobe

CARBIDE DRILLS and REAMERS



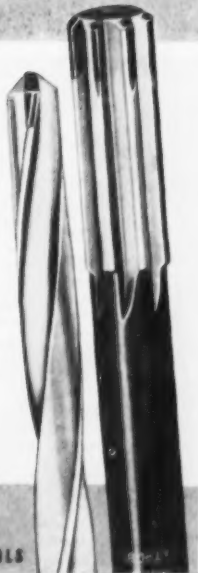
Stocked and sold by
service-minded Industrial Distributors

CHICAGO-LATROBE

419 W. ONTARIO STREET • CHICAGO 10, ILLINOIS

DRILLS • REAMERS • COUNTERSINKS • COUNTERBORES • SPECIAL TOOLS

For more data circle 429 on Reader Service Card



**SOLVE YOUR
MICRO-DRILLING
PROBLEMS**

USE THE PERFECT COMBINATION
For Assured Accuracy

LEVIN[®] COLLETS



Super precision collets for jewelers type lathes. Ideal for holding micro-drills or other parts where concentricity is important. Available from stock in complete range of sizes from .004" (.1 mm) to 5/16" (8.0 mm).

SPHINX MICRO-DRILLS

High speed steel micro-drills with straight or spiral flutes in sizes from .1 mm (.004") to 3.0 mm (.1181"). Left

hand micro-drills for use on Swiss type automatic screw machines. Short flute center drills. Send for Bulletin "Q" listing complete line of drills or Catalog M listing collets as well as full line of instrument lathes and accessories.



LOUIS LEVIN & SON, INC.—3610 S. BROADWAY—LOS ANGELES 7, CALIFORNIA

For more data circle 430 on Reader Service Card

**LEADERS IN
METALWORKING**
depend on
LEADERS IN TOOLING



**THAT'S WHY METALWORKING
LEADERS USE THIS**

Quality, speed, precision . . . yes, and profits in metalworking usually depend on **TOOLING!** Engineering ingenuity based on experience together with quality control in uniformity of ATRAX tooling pays dividends in production . . . dividends in quality . . . dividends in profits.

Join the profit parade . . . follow the leaders!

Send for the 88 page catalog of ATRAX solid carbide tools TODAY!



CATALOG



**to specify these ATRAX SOLID
TUNGSTEN CARBIDE TOOLS!**



*Finish **FIRST** with Carbide!*

THE ATRAX COMPANY

Newington, Connecticut

For more data circle 431 on Reader Service Card

new shop equipment

**Descriptions of new machines, tools
and materials for metalworking.**

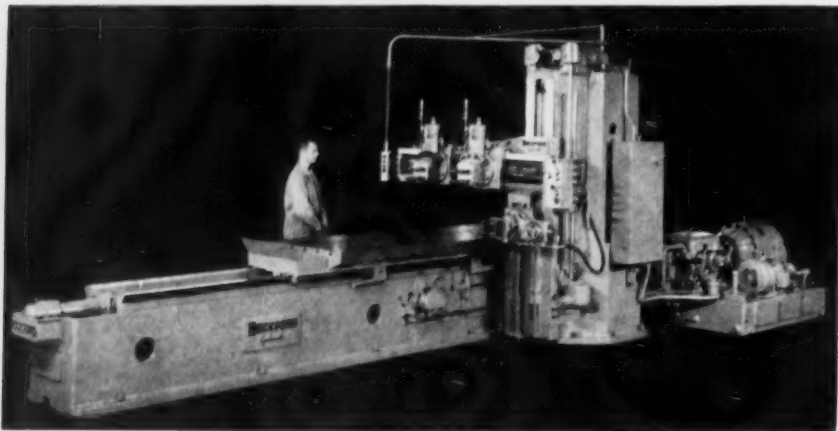
Edited by R. L. GRIESINGER

HEAVY-DUTY OPENSIDE HYDRAULIC SHAPER-PLANER

Rockford Machine Tool Co., Dept. Q, 2500 Kishwaukee St., Rockford, Ill., has announced a heavy-duty openside hydraulic shaper-planer which is available in 30 x 24, 30 x 30, 36 x 36 and 36 x 42-inch table sizes with stroke lengths from 6 to 20 feet in increments of 2 feet. The machine is equipped with the new Hydraulic Triple Circuit which is said to provide the correct combination of cutting speed and required force to most economically ma-

chine materials from free-cutting types to the toughest steels. Three distinct cutting ranges are provided, including high speeds for low cutting force; medium speeds for medium cutting force; and low speeds for heavy cutting force. Infinite speeds range from 10 to 300 f.p.m. with maximum return speed regardless of cutting speed.

The machine has a heavy column with a long joint face for attaching to the bed. The cross rail is wide and deep and it has a large bearing surface on the column ways. According to the manufacturer, rugged tool heads with



Rockford Heavy-Duty Openside Hydraulic Shaper-Planer with Hydraulic Triple Circuit

a vertical feed engagement permit better control by the operator. The tool head saddles, as well as the vertical feed slides, are equipped with adjustable double nuts, eliminating backlash and making it simple for the operator to set up jobs. All tool heads have an inside clapper block arrangement and a positive abutment to take the thrust of the cut. For convenience when finish planing with a broad nose tool, maximum cross feed and vertical feed to all heads is 0.500 inch.

For more data circle 77 on Reader Service Card

★ ★ ★

DOUBLE-ACTING TUBE PIERCING UNITS

A line of double-acting tube piercing units for use in press brakes and punch presses has been announced by Wales-Strippit Corp., 345 Payne Ave., North Tonawanda, N. Y. According to the manufacturer, the units have many applications in fabricating such products as tubular furniture, aircraft components and many other uses where clean, accurately located single or multiple holes are required in tubular parts. They are specially designed to eliminate many of the troublesome set-up and maintenance problems encountered in short and long run punching of tubing. Alignment between upper and lower sections is obtained by simply applying a straightedge to the surfaces of the adapter plates which fit over the tubing in the punch. Since there is no die in the unit, there is no danger of shearing the punches through misalignment.

Wales tube piercing units can be set up on flat plates for mounting to bolster and ram plates of punch presses. Keyed plates for mounting individually in press brakes can also be furnished. For a series of holes, templates for mounting the desired number of units in the required positions can be sup-

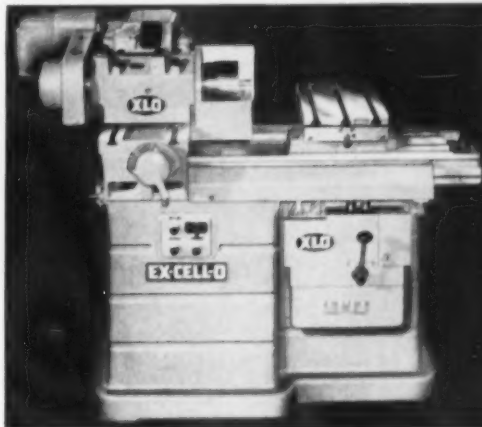
plied. Capacities of standard tube piercing units are 1/2 to 1 inch o.d. tube; maximum punch diameter is 0.312 inch; and maximum wall thickness of tubing is 0.093 inch. Special units for larger size holes and larger tubing are available.

For more data circle 78 on Reader Service Card

★ ★ ★

PRECISION BORING MACHINE ACCOMMODATES SMALL AND MEDIUM SIZE WORK

Designated as the Style 2112-B, a precision boring machine which is designed to accommodate small and medium size workpieces and which has a 12-inch table travel has been announced by Ex-Cell-O Corp., Detroit 32, Mich. A wide variety of table feeds and speeds is provided by a newly designed hydraulic control panel. Minutely adjustable dials control feed rates in both directions of table travel. Smooth table movements, even during heavy machining resistance, is claimed to be assured by automatic compensating pressures. A heavy, well ribbed, nickel iron casting is used for the base. According



Ex-Cell-O Style 2112-B Boring Machine

new shop equipment . . .

to the manufacturer, Ex-Cell-O precision spindles, isolated power assemblies and the rigid machine base provide vibration-free performance and inherent precision.

The machine also features fast rapid traverse, spindle brakes, permanently lubricated spindles and automatically lubricated ways. Ideally suited to tool-room work because of its accuracy and flexibility, the Style 2112-B machine can be set up for production work with the controls locked for continuous reproduction to close limits.

For more data circle 79 on Reader Service Card

★ ★ ★

SPECIAL MACHINE PROCESSES CRANKSHAFTS AT HIGH PRODUCTION RATE

Michigan Drill Head Co., P.O. Box 4643, Detroit 34, Mich., has developed a special machine for processing V-8 crankshafts at the rate of 100 pieces per

hour at 100 per cent efficiency. The machine drills, chamfers, finish reams, form seats and taps both ends of the crankshaft. The unit is a double-end trunnion-type machine with pot-type heads which permit economical replacement in the event of engineering changes. The heads also feature lead screw spindles, with quick-change nuts for easy replacement.

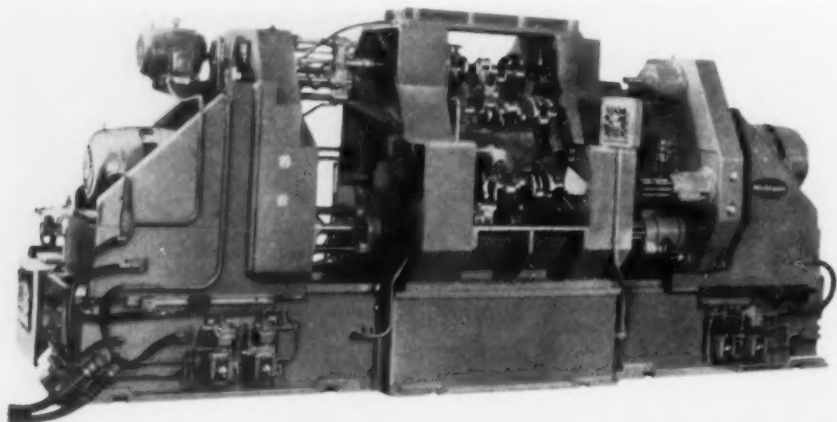
The machine is built up from standard floor-type feed units with hardened and ground ways. The trunnion fixture is arranged with power-operated shot pins for positive location prior to the machining operations. The machine is built to J.I.C. electrical and hydraulic standards, and is automatically lubricated throughout.

For more data circle 80 on Reader Service Card

★ ★ ★

ROUGH TURN LATHE PRODUCES 8-INCH SHELLS

A rough turn lathe for the production of 8-inch shells has been introduced by The Cross Co., Detroit 7, Mich.



Michigan Special Machine for processing V-8 crankshafts at high production rate

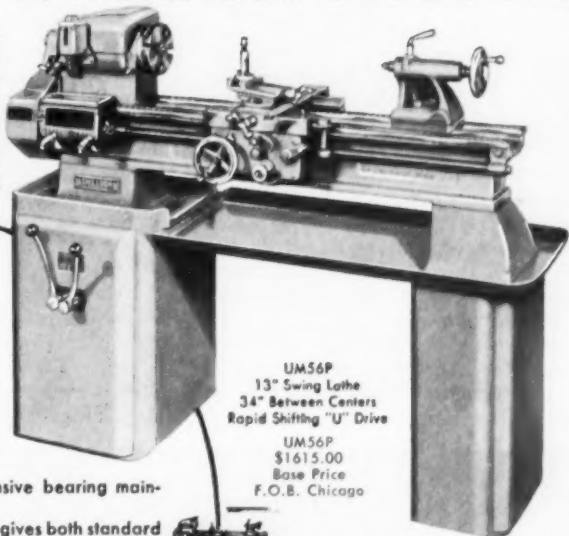
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Sheldon Lathes are designed and built to do accurate lathe work rapidly and profitably. Moderate in price they have the collet, swing and power capacity to do most toolroom work.



UM56P
13" Swing Lathe
34" Between Centers
Rapid Shifting "U" Drive

UM56P
\$1615.00
Base Price
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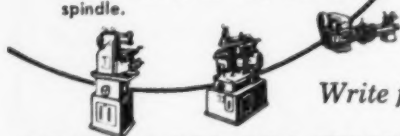
Design

Features:

- Large and wide "Zero Precision" Tapered Roller Spindle Bearings—permit operation at all speeds, retain accuracy, end expensive bearing maintenance costs.
- 54-pitch Gear Box—gives both standard and many hard to get thread ratios.
- Large Micrometer Dials—Make accurate operation easier.
- Extra Collet Capacity—1 3/4" hole through spindles available on 10", 11" and 13" swing lathes.
- More Power to Spindle—Efficient drives with bigger motors and double neoprene cog V-belts to spindle.

OPTIONAL FEATURES AT EXTRA COST

include: Hardened ways, Long Tapered Key Drive Spindles, 4" D1 Camlock Spindles bed turrets, collet attachments, and other production and toolroom accessories. Lathes available with a choice of "Bench," "Cabinet" or "Pedestal" mountings.



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SHELDON MACHINE CO., Inc.

4250 N. Knox Ave.

Chicago 41, Illinois

For more data circle 432 on Reader Service Card



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The specially designed machine rough turns the outside diameter, finish faces and chamfers the base end of the shells, producing 12 units per hour at 100 per cent efficiency. The lathe incorporates seven overhead, individually-controlled, contour turning tools, and base facing and chamfering tool.

Rough and semi-finish cutting is accomplished in one automatic cycle in sequence, controlled from a centralized push-button station. The lathe has hydraulic feed and rapid traverse, hydraulic power-operated tailstock and hydraulic work clamping. With preset tooling, 150-h.p. spindle drive motor and J.I.C. standard construction, the lathe also features an automatic lubrication system for lubricating the ways and all miscellaneous points with every machine cycle. Construction is modular-type for maximum flexibility and open bed for ample capacity in sluicing chips to the rear of the machine. A

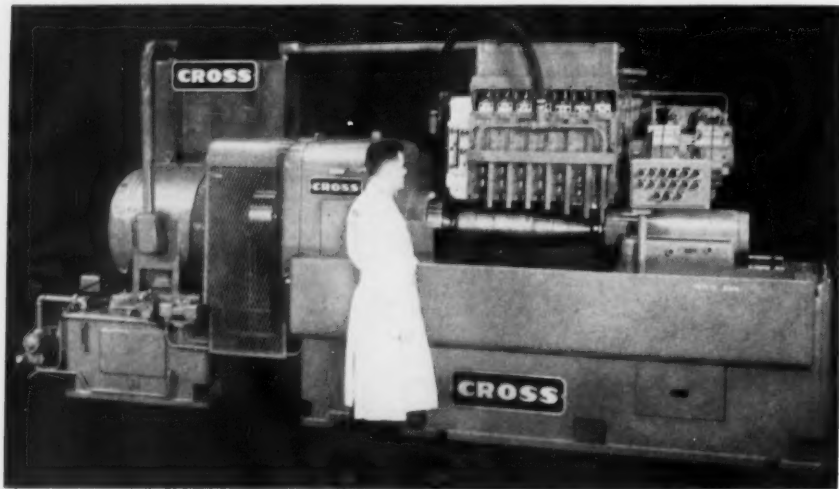
convenient loading and unloading operation is provided, without the necessity of lifting the shell.

For more data circle 81 on Reader Service Card

★ ★ ★

MACHINE AUTOMATICALLY BROACHES 10 INTERNAL SPLINES IN ONE PASS

Designated as the PD-6-30-60, a 30-ton, 60-inch stroke, pull-down broaching machine which is designed to automatically broach 10 internal splines in an automotive brake drum in one pass has been announced by American Broach & Machine Co., Ann Arbor, Mich. For conveyor line operation, the machine automatically picks up parts coming in from a conveyor line, transfers them to broaching position and after broaching, ejects them back on to the line. A hydraulically-operated loading mechanism with an internal chucking device picks up the part off the conveyor and transfers it across to the sliding work-holding fixture. The



Cross Special Rough Turn Lathe designed for producing 12 8-inch shells per hour

THE

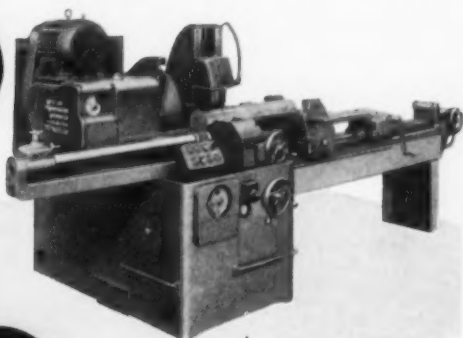


IS A

Triple-threat

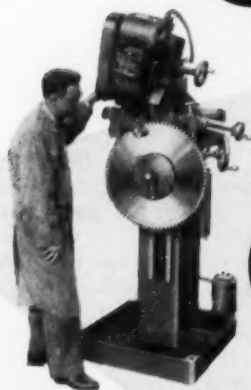
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CIRCULAR
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MACHINES



The No. 2-8 machine for cutting off solid metal up to 8' square.

SAW
BLADE
SHARPENERS



The G-45 sharpener for blades 8' through 48' diameter.

SAW
BLADES



M. & M. saw blades cut any machinable metal. Cut-off blades: segmental - 11' through 120' diameter; solid - 8' through 20' diameter. Slitting saws - 3' through 8' diameter.

You may profit immensely by applying the M. & M. Triple Threat to your cut-off costs. Machine, blade, and grinder, made by the first company to build all 3, often effect phenomenal savings, as proved by detailed case studies. *Just such a study of your job is yours for the asking.* We offer you an unmatched experience in the sawing of any machinable metal, round, square or structural shapes, from 1/4" through 43" diameter.

THE MOTCH & MERRYWEATHER MACHINERY CO.

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CLEVELAND 13, OHIO

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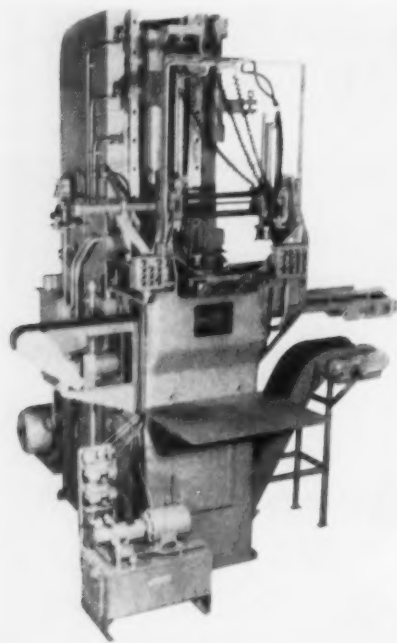
January, 1956

modern machine shop 233

new shop equipment . . .

collet-type fixture automatically clamps the part and moves it into broaching position.

The broach is pulled down through the part, broaching ten 1-inch wide splines in the workpiece. At the end of the broaching stroke, the slide moves out, automatically ejecting the part back on to the belt conveyor. The broach returns to starting position. During the broaching and return stroke, the loading unit moves across on guide rails, picks up another part from the conveyor line and returns ready to reload the work fixture. The machine runs continuously on automatic cycle as long as parts are coming in from the conveyor line.



American PD-6-30-60 Broaching Machine

A separate oil tank is provided for the hydraulically-operated fixture. The machine has an automatic chip conveyor unit for disposal of chips. A full follow-up retriever mechanism follows the broach through the stroke. Tooling includes precision-type broach pullers with multiple springs and alignment pilots, a hardened and ground arbor which holds 10 broach assemblies and American high speed steel sectional surface broach assemblies approximately 48 inches in length.

For more data circle 82 on Reader Service Card

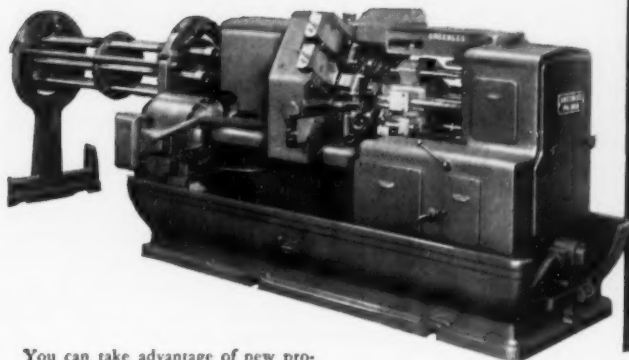
★ ★ ★

DIAL TYPE MILLING MACHINES HAVE MANY FEATURES

A line of dial type milling machines which are new from the floor up has been introduced by The Cincinnati Milling Machine Co., Cincinnati 9, Ohio. According to the manufacturer, the machines are much more powerful than the former design; push buttons reduce operating effort; and they have a wider range of speeds and feeds for machining operations on light metals, as well as the newer and tougher alloys. The dial type mills are built in Nos. 2, 3 and 4 sizes and in plain, universal and vertical styles for each size. Spindle speeds range from 18 to 1,800 r.p.m. for the No. 2 size, and 16 to 1,600 r.p.m. for the Nos. 3 and 4 sizes. Speeds are indicated by two push buttons; namely, "increase" and "decrease," at the "console" speed change located in front of the knee, or at the left-hand side of the column, as desired. The starting lever has been eliminated, and push buttons now start and stop the spindle drive. The No. 50 standard spindle nose has been retained.

Three electrical control buttons are located on the right-hand side of the column, built into the electrical compartment cover. These buttons start and stop the motor and the coolant

now... greater accuracy, faster production



WITH
GREENLEE
SIX-
SPINDLE
AUTOMATICS

You can take advantage of new production techniques...attain higher levels of efficiency with the improved Greenlee 6-Spindle Bar Automatic. Its advanced design opens the door to some real profit opportunities. • These design improvements are fully described in a catalog recently issued. Let us send you a copy today. Find out how Greenlee Automatics can save time and money in your plant. It will pay you to investigate.

IMPROVED SPINDLE CONSTRUCTION

The spindle has been completely redesigned to assure greater accuracy at higher speeds. True running...the new Greenlee spindle has five widely spaced, preloaded, angular-contact, precision ball bearings. Entire spindle is dynamically balanced for smooth operation. Metallic seals, labyrinth and friction washers with line contact provide maximum heat dissipation.

INCREASED SPEED

Spindle speed range has been increased. Enables you to take full advantage of the top efficiency and peak performance which carbide and high-speed tooling offer. Reduces downtime losses and tool costs.



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CATALOG
No. A405



GREENLEE BROS. & CO.
1881 Mason Avenue
Rockford, Illinois

For more data circle 434 on Reader Service Card

new shop equipment . . .

pump. A nearby disconnect switch is also built into the electrical compartment cover. A new synchro-mesh principle is incorporated in the spindle drive. When the motor is running, the gear train constantly rotates at a very slow rate to facilitate shifting of gears and to eliminate clashing noises. The spindle drive clutch and brake are hydraulically operated and require no adjustment.

Thirty-two feeds, from $\frac{3}{8}$ to 90 inches per minute, are selected with a knob, one at the front and one at the rear operating stations. An extra large feed indicator dial is located on the side of the knee, clearly visible from both operating stations. Power rapid traverse is at the rate of 150 inches per minute (table and cross). Feeds and rapid traverse are now powered by an independent 3-h.p. motor mounted on the knee. This type of drive simplifies maintenance problems and permits the full power of the main drive motor to be transmitted to the spindle. The feed

box is a self-contained unit mounted in the knee. The cutting fluid pump is also individually motor driven.

Plain and vertical machines are available with and without automatic table cycles. When equipped with this feature, the machine retains all its characteristics of versatility for variety toolroom milling, and in addition, a single four-position lever is provided for manual table control. Automatic cycle machines may be tooled up with one fixture for one-way single cycles, or fixtures at both ends of the table for two-way reciprocal milling, either continuous or with center safety stop. The latter type of cycle is possible because of the automatic backlash device, a standard feature of all dial type milling machines.

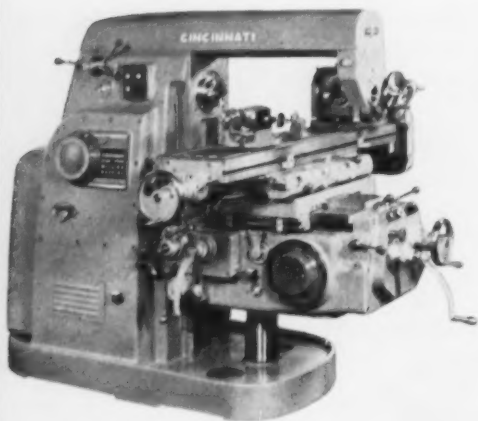
Instantaneous engagement of feeds at the higher rates is smooth and sure through a new type of spring clutch on the table feed screw. Additional operating safety will be found in the automatic knock-out of the table handwheel (patterned after the same feature for the cross and vertical front control cranks) and an interlock arrangement in the rear hand-crank sockets for cross and vertical traverse, preventing them from being operated when the corresponding power feed is engaged, and vice versa.

For more data circle 83 on Reader Service Card

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PRESS DESIGN IMPROVEMENTS AFFORD AMPLE DIE AREA

Niagara Machine & Tool Works, 683 Northland Ave., Buffalo 11, N. Y., has announced numerous design improvements in its line of gap frame double crank presses to afford ample die area, unusual accessibility and convenient work handling. Available in two types, upright (Series B) and open back inclinable (Series B1), the line is said to be suitable for a variety of work in-



Cincinnati Dial Type Milling Machine

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"F" SERIES

Infinitely Variable Speed

DRILLING and TAPPING MACHINES

**The Right Machine for You . . .
For Your Job . . . For Your Product . . .**

Sensitive, medium, or heavy duty production drilling and tapping operations all become easier and faster with lower costs and fewer rejects when Edlund "F" Series machines are used.

**Edlund Model 4F ▶
For Heavy Duty Operations
Infinitely Variable Speeds to
2000 RPM
12" Overhang, 1 3/4" Capacity**

**Edlund Model 1F
Extreme Sensitivity
Infinitely Variable Speeds
to 10000 RPM
Micrometer Graduated Depth
Gage to .001"
Adjustable Spindle Tension
7" Overhang, 3/8" Capacity**

**Edlund Model 2F
For Medium to
Heavy Operations
Infinitely Variable Speeds
to 3600 RPM
8" - 12" - 15" Overhang
1 1/4" Capacity**

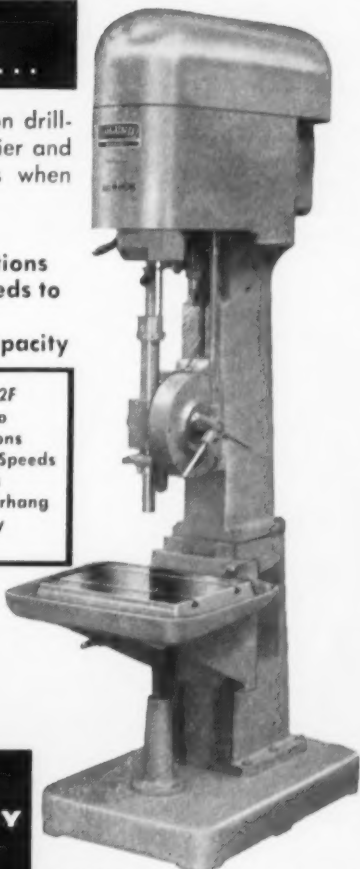
Infinitely variable spindle speeds, rugged construction, and rapid production features make Edlund "F" Series machines the logical choice for plant expansion and replacement of obsolete equipment.
Write for descriptive Bulletins today.

*America's
Most
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Drilling
Machine*

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Cortland, New York

DIVISION - PRECISION CASTINGS CO., INC.
SUBSIDIARY - HARRISBURG STEEL CORPORATION



EDLUND Representatives in major cities

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new shop equipment . . .

volving long, progressive dies; multi-station dies, automatic feeds and drawing operations (when equipped with Niagara die cushions). Standard capacities range from 45 to 200 tons.

A wide, all-welded steel, box-type slide, which is fully contained within the gibbing, rigidly supports the punches. Overhanging flanges are claimed to be eliminated. Two rugged connections directly resist any tendency of the slide to tilt under off-center loading, thereby minimizing misalignment of dies.

Precision, "V" flat gibbing is brought down close to the point of application. The rigid, integrally built, all-welded steel, stress-relieved frame of the press properly resists deflection, thereby maintaining permanent align-

ment of bearings and slide. An over-size, adjustable air counterbalance provides smooth press action.

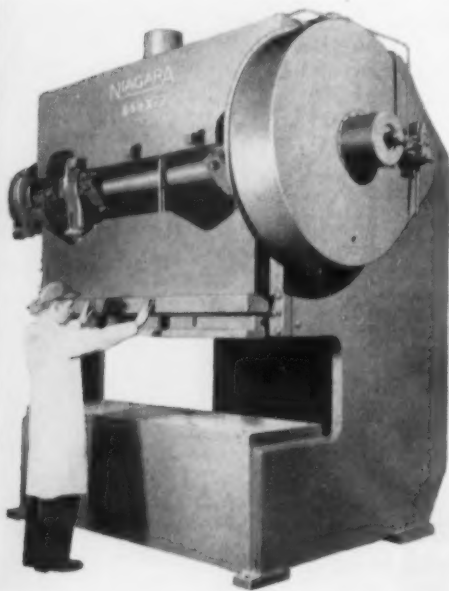
For more data circle 84 on Reader Service Card

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23-FOOT CONVERTIBLE-TYPE PLANER HAS A MOVABLE HOUSING

To reduce overall setup and machining time on large castings, Hamilton Division, Baldwin-Lima-Hamilton Corp., Hamilton, Ohio, has developed a 23-foot convertible-type Niles planer with a movable housing for a producer of large forging machine beds. The machine is said to be capable of planing—in one setup—any casting within the width and height limits permissible for flatcar shipment. The Niles planer is described as combining the rigidity and accuracy of a double housing planer with the versatility of a convertible planer. The machine has a capacity of 15 feet under the crossrail, maximum width of 23 feet, minimum width of 13 feet and a planing length of 24 feet. A double housing unit with an adjustable auxiliary left-hand housing, the planer is equipped with two planing heads on the crossrail and two side heads, with one of the side heads mounted on the auxiliary housing. Planing speeds range from 3.4 to 102 surface feet per minute.

The impressive size of the planer is further indicated by a rail width of 41 feet, an overall height of 28 feet 7 $\frac{7}{8}$ inches above the floor line, with the auxiliary housing 18 feet below floor line. Design features include what the design engineers call "built in skill." Each of the rail planing heads is equipped with pendant controls which give the operator flexibility in adjusting the cutting action. Pendant stations have a feed-traverse selector switch, a feed jog button, an "up-right, down-left" selector switch, a rail head feed

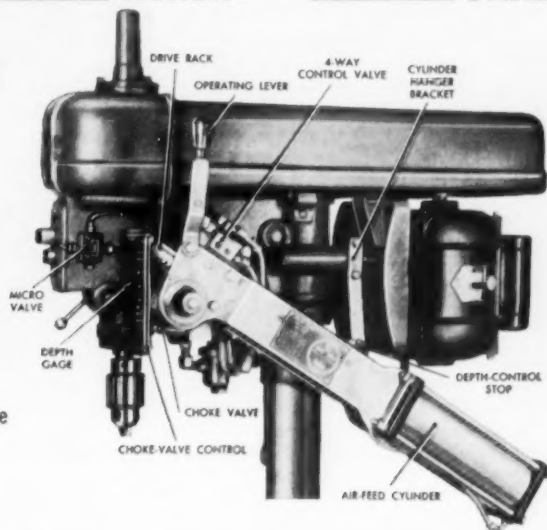


Niagara Series B Double Crank Press

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**You can install
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time-saving,
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Air Feed
in 10 minutes!**

Send for new, **FREE** 24-page
manual on application of
Air Feed to Drill Presses!



100% PNEUMATIC! NO ELECTRICAL CONNECTIONS! NO MACHINING! Converts any Walker-Turner, or W-T type, Drill Press up to 1" capacity to a high production power-fed drilling machine. Gives sensitive, automatic feed control for a wide variety of production operations in metal or wood. . . . Air Feed Attachment for 15" and 20" Drill

Presses, 4" and 6" spindle travel; prices start at \$185. Air Feed-equipped Walker-Turner 15" and 20" Drill Presses, 4" and 6" spindle travel; prices start at \$353. . . . Ask your Walker-Turner Distributor to *demonstrate*. He's listed under "Tools" in your phone book's Yellow Pages. Or write for his name and new, *free* Manual.

DRILL PRESSES, HAND AND POWER FEED — AIR FEED DRILL PRESS ATTACHMENT —
RADIAL DRILLS — WOOD AND METAL CUTTING BAND SAWS — TILTING ARBOR SAWS —
RADIAL SAWS — JIG SAWS — CUT-OFF SAWS — LATHES — SPINDLE SHAPERS —
JOINTERS — BELT AND DISC SURFACERS — FLEXIBLE SHAFT MACHINES



WALKER-TURNER

Division

Kearney And Trecker Corporation • Plainfield, N. J.

For more data circle 436 on Reader Service Card

January, 1956

modern machine shop 239

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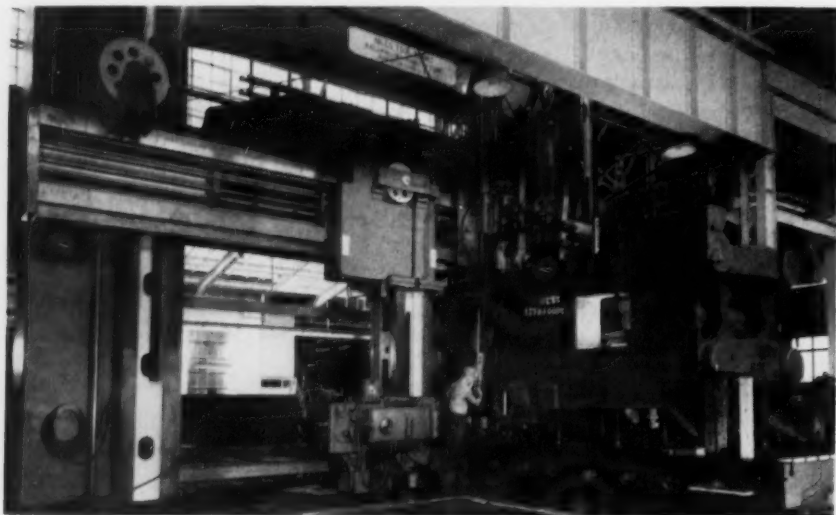
start and stop button, an inch cut and an inch return button for the main drive, an automatic cut and automatic return main drive button, and a stop wobble stick mounted on the bottom of the pendant station.

The rail heads have rapid traverse in all directions and power and hand feed for cross, vertical and angular travel. The tool slides and clapper boxes have independent swivels with swivel adjustments made through a worm gear, pinion and a rack segment at the top of each member. Side heads also have power and hand feed for vertical, cross and angular travel, as well as rapid traverse in all directions. The machine table is 12 feet wide which permits the machining of three sides of the workpiece at one time, without a second setup.

The adjustability of the left-hand housing and planing head is one of the

most important design features of the machine. It is this auxiliary housing that gives the machine its great flexibility. Located between the left-hand stationary housing and the table, the auxiliary housing is supported at the top and bottom by saddles dove-tailed to the crossrail and to the lower auxiliary rail. The table has three tracks on the bed, a V-way in the center and flat ways on either side of the V-way. All three tracks have non-metallic wear plates. Horizontal power adjustment is provided by two traverse screws, one located on the crossrail and one in the lower auxiliary rail.

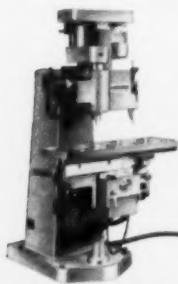
The machine is driven by 100-h.p. variable-voltage, 40 to 1,200-r.p.m. reversing motor. The planer's 100-kw. generator is driven by a 150-h.p. 1,800-r.p.m. motor. Other motors on the machine include a 40-h.p. motor for rail elevating; a 7½-h.p. motor for feed and traverse for each of the four heads; various other motors for rail clamp, auxiliary housing traverse, table drive and table track lubricating pumps, feed



Huge Niles 23-Foot Convertible-Type Planer for machining large forging machine beds



PRATT & WHITNEY VELVETRACE (TRADEMARK) MILLING MACHINE



WORK CAPACITY
12" x 9"
SPINDLE SPEEDS
310 to 10,800 rpm



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- ENTIRELY NEW, UNIQUE TRACER CONTROL . . . follows the finest detail of any 3-dimensional model with extreme accuracy . . . but *WITHOUT TOUCHING IT*. Utilizes short spark gap between tracer and model for control. Cannot damage any model, however soft or fragile, even when using the smallest diameter tracers. There is no mechanical motion in the tracer . . . and therefore no positional offset or time lag.
- AUTOMATIC OPERATION . . . Spindle, table and carriage are driven through new type magnetic clutches which provide maximum sensitivity and continuously variable speed control, and eliminate backlash. Machine automatically cuts any 3-dimensional shape (including square walls). Spindle quill "roll feeds" in precision preloaded ball bearings . . . original high accuracy and rigidity are maintained indefinitely.

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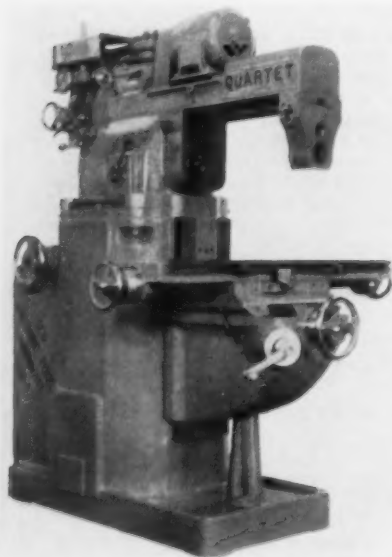
box and lubricating pumps. The main drive motor is mounted below the floor level on the right side of the machine facing the crossrail. The deep pit for the auxiliary housing on the left side of the machine made it impossible to locate the motor in the normal mounting positions.

For more data circle 85 on Reader Service Card

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HORIZONTAL SPINDLE INDEXES FOR UNIVERSAL MILLING OPERATIONS

The horizontal spindle, rather than the saddle and table, now indexes for universal milling operations on the "Quartet" Milling Machine built by U. S. Burke Machine Tool Division, 3



U. S. Burke "Quartet" Milling Machine

Brotherton Rd., Cincinnati 27, Ohio. The spindle is mounted in a massive turret which may be swiveled 360 degrees by means of a worm and worm wheel. When the machine is used as a universal horizontal miller, the spindle is indexed to the required angle, rather than swiveling the saddle. This feature is said to provide unusual rigidity for precision work. The table retains its inherent stability, and the turret locks securely at the desired angle. In addition to universal and horizontal operations, the machine will perform vertical and angular milling operations with speed and ease of change-over from one type milling to the other.

The "Quartet" is a full No. 2 milling machine, weighing 4,500 pounds, with 30 inches of horizontal travel, 11 inches of cross travel and 16¼ inches of vertical travel. The horizontal spindle has either a No. 40 or No. 50 taper and is driven by a 3 or 5-h.p. drive motor. The independently operated power-feed vertical head is driven by a 1½-h.p. motor mounted on the rectangular overarm. Rapid traverse power feed to the saddle and table is standard equipment. The overarm is positioned through rack and pinion, and the vertical head may be tilted to the required angle by means of a conveniently located crank handle. Among the other unusual features of the machine are the infinitely variable horizontal spindle speeds from 29 to 1,450 r.p.m.; the fact that both the horizontal and vertical spindles may be used simultaneously; and the ability to operate the machine while the turret is in the process of being indexed.

For more data circle 86 on Reader Service Card

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HYDRAULIC PRESS IS ELECTRICALLY CONTROLLED

Designated as the Model "SF 300," a double-action hydraulic press which

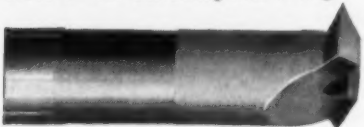
Check List for Handy Literature on



STYLE A—for general boring



STYLE B—for bottoming and facing



STYLE C—for internal threading

BOKUM BORING TOOLS

To help you select the right tool for the job you have, Bokum has prepared a complete list of catalogs and template drawings covering Bokum products. Here is a handy check list—write for the copy, or copies you need:

- Boring and threading tools—super high-speed steel
- Jig boring sets of high-speed steel tools
- Carbide-tipped boring and threading tools
- Jig boring sets of carbide-tipped tools
- Solid Tungsten carbide boring tools
- Short Neck boring tools 500 Series, High-speed steel
- Short Neck boring tools 500 Series, Carbide-tipped
- Short Neck boring tools and threading tools
- Lathe holders for boring and screw machines
- Price sheet for holders shown in
- Holders for turret lathes and screw machines
- Thread Recessing tools Style T-R
- Back Chamfering tools Style B-CH
- O-Ring Grooving Tools
- Retaining Ring Grooving Tools (internal)
- Resharpener fixture for small tools—Nos. 00000 to 3, Style A & B
- Resharpener fixture for tools Nos. 4 to 12, Style A & B
- Resharpener fixture for tools Nos. 00000 to 9, Style A, B and C
- Universal Resharpener Fixture for tools
- Resharpener Manual for all Bokum Tools
- Rapidor External Turning and Threading tools

Cat. 1139-6
Supplement No. 1 to Cat. 1139-6
Cat. 398-6
Supplement No. 1 to Cat. 398-6

Cat. 948
Cat. HSS. 500
Cat. CT. 500
Cat. 483

Supplement No. 1 to Cat. 483
Cat. 483
Cat. T-R
Cat. B-CH
Cat. O-R

Cat. RR
Cat. AB-1
Cat. AB-4-12
Cat. ABC Universal
Cat. Manual 949
Cat. Rapidor 454

Bokum tools are available in high speed steel, carbide-tipped and solid tungsten carbide. Applications: boring, recessing, chamfering, undercutting, serrating, burring, boring and facing, centering, end radius forming, form relieving, boring and chamfering and many others.



TRADE MARK REG. U. S. PAT. OFF.

BOKUM TOOL CO.

14775 Wildemere Ave.,
Detroit 38, Mich.

For more data circle 438 on Reader Service Card

DEPENDABLE ACCURACY



INSPECTION TOOLS made of MEEHANITE METAL are designed to fill your various Inspection and Checking needs. Sturdily constructed to give you reliable, accurate service.

Surface Plates — Box Parallels
Slotted Angle Plates
Universal Right Angles
Flat Parallels — Lapping Plates
Toolmaker's Knees — "V" Blocks
Straight Edges (Bridge Type)
Straight Edges (Leveling Type)
Measuring Irons
Masterangle Plates
Angle Attachments

Send for Bulletin

ACME TOOL CO.

73 W. Broadway, New York 7, N. Y.

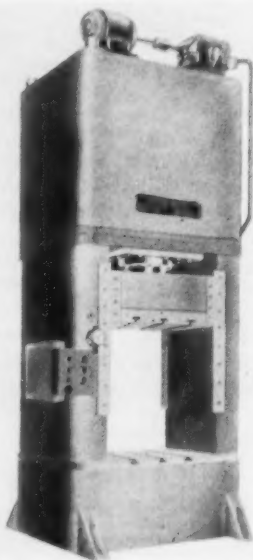
For more data circle 439 on Reader Service Card

244 modern machine shop

new shop equipment . . .

is electrically controlled for either automatic or semi-automatic operation has been announced by Clifton Hydraulic Press Co., 284-292 Allwood Rd., Clifton, N. J. The slide return may be controlled by either pressure or length of stroke setting. The return may be inched up or down, or the press may be operated manually when the slide is in the up position. The pump bypasses at zero pressure. The press features all steel construction, except for the ram which is close-grained cast iron accurately ground on the sliding surfaces. The removable cylinder is precision ground internally to receive the piston. The ram is double acting with automotive-type piston rings accurately fitted to the ram head.

The double-action press may be equipped with hydraulic cushions in



Clifton Model "SF 300" Hydraulic Press

January, 1956



The Secret
is in the

Point!



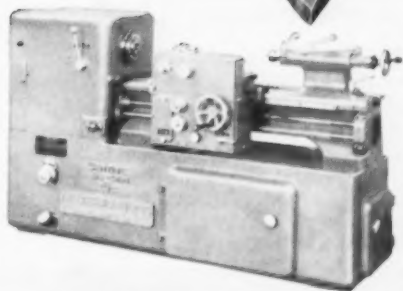
VERSATILITY is the name for Cri-Dan "B"—versatility in all threading operations within the scope of its capacity. (See capacity table.)

The secret of Cri-Dan "B"'s success lies in the single carbide-tipped point that threads with a speed and accuracy no similar threader can match.

A simple facing slide on the rear of the machine enables the Cri-Dan "B" to face as well as thread in one fast operation.

Users tell us that Cri-Dan "B" has solved many tough threading problems *they could not accomplish on ordinary threaders* . . . and saved money to boot!

Ask your Lees-Bradner representative for the facts on threading the modern Cri-Dan way. Then you, too, will get the "point".



Cri-Dan "B" Single Point High-Speed Threading Machine

CAPACITIES

Spindle speed (in 24 steps)	145-2800 RPM
Swing over saddle	4"
Swing over bed	13"
Capacity between centers	36"
Maximum Standard thread length	2½"
Rated capacity	8 TPI-40 TPI
Maximum number of thread starts	6
Maximum Taper Thread	28° incl.

CRI-DAN DIVISION

the **LEES-BRADNER** [®]

CLEVELAND 11, OHIO, U.S.A.

Company

For more data circle 440 on Reader Service Card

new shop equipment . . .

the bed for metal drawing applications. The machine can be built to meet practically any speed, stroke or platen size requirement, and is available in capacities of 50, 100, 150, 200 or 300 tons.

For more data circle 87 on Reader Service Card

★ ★ ★

MACHINE PLUNGE GRINDS MULTIPLE DIAMETERS SIMULTANEOUSLY

Norton Co., Worcester 6, Mass., has announced the Type CMS-1 Semi-Automatic Multi-Wheelslide Cylindrical Grinding Machine, a special-purpose grinder which can be adapted to a wide range of cylindrical grinding operations. The principle advantage of the machine is said to be its ability to

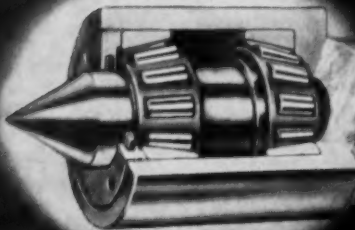


Norton Type CMS-1 Semi-Automatic Multi-Wheelslide Cylindrical Grinding Machine

plunge grind multiple diameters simultaneously on workpieces which, because of their shape, do not lend themselves to grinding on conventional multi-wheel machines. According to the manufacturer, savings in both set-up and grinding time are substantial.

... heavy loads at high speeds

Falls ROTO CENTER



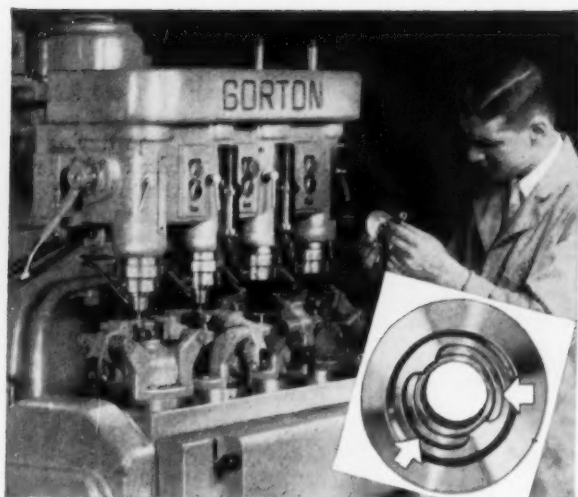
**for
lathe and grinder
tail stocks**

Accurate, low cost turning on tough continuous-run work. Preloaded, matched roller bearings assure rigid set-up. Precision ground shank. Heavy-duty grease seal. Many exclusive features.



FALLS PRODUCTS, INC., 124 Genoa Street, GENOA, ILL., U.S.A.

For more data circle 441 on Reader Service Card



PRODUCTION FACTS: Mill two locking lug recesses in bevel gear blanks in one pass.

50,000 Monthly Production with GORTON ROTARY DUPLICATOR

Four spindles operate in pairs with their respective rotating fixtures so that the operator unloads and reloads one pair of fixtures while the other two cutters mill two recesses in each of two beveled gear blanks.

Milling operation is mechanical — no electronic, hydraulic or pneumatic controls are used other than air operated clamps.

CAN PERFORM TWO DIFFERENT OPERATIONS AT THE SAME TIME

Each pair of fixtures is controlled by one of two masters mounted within the table. When one pair of spindles is lowered to fixed depth and the cycle starts, the rotation of fixtures and cross movement of table feed the work to the cutters to produce the desired shape. One pair of spindles can perform one operation on two pieces while the other pair performs a different operation on two other pieces.

EASILY MODIFIED TO MEET YOUR NEEDS...



GEORGE GORTON MACHINE CO.

1701 Racine Street • Racine, Wisconsin • U. S. A.

SINCE 1893

Tracer-Controlled Pantographs, Duplicators — standard and special... Horizontal and Vertical Mills, Swiss-Type Screw Machines, Tool Grinders, Small Tools and Accessories.

For more data circle 442 on Reader Service Card

A 8218-1PA

January, 1956

modern machine shop 247

ADDITIONAL TOOLS by GORTON

PANTOGRAPHS

Five models of 2- and 3-dimensional machines for engraving, profiling or die sinking — either manually operated or tooled for automatic cutting cycle operation.

SUPER-SPEED VERTICAL MILLS

Three sizes, designed for fine work in the machine shop, tool room and in die and mold shops.

DIE AND MOLD DUPLICATORS

Three sizes of manually operated precision duplicators — also multiple spindle models, either manual control or automatic cutting cycle.

Super-Speed HORIZONTALS, UNIVERSALS, VERTICALS

Six models, featuring 56" tables (28" travel), 62" tables (34" travel) or 76" table (48" travel).

SWISS-TYPE AUTOMATIC SCREW MACHINES

For high production turning of small slender parts to high precision standards.

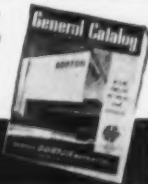
MACHINES FOR HIGH PRODUCTION

MULTIPLE-SPINDLE ROTARY DUPLICATORS

MULTIPLE-SPINDLE INDEXING PANTOGRAPHS
For multiple operations at production rates with high repetitive accuracy.

MULTIPLE-HEAD ETCHERS
For permanently marking hardened or finished parts.

Write for Complete Catalog 1655-1701.



new shop equipment . . .

The Type CMS-1 has sturdy, unitized wheel slides which are positioned during manufacture for the requirements of a specific job. The wheel slides may be opposed or placed in line. Pro-

vision is made for slight angular or lateral adjustment of position for set-up purposes. The slides are self-contained with respect to motion and truing but operate in unison during production. Centrally-located "one lever" control of the automatic grinding cycle and automatic termination of the cycle

under electrically-timed control greatly simplify operation. Auxiliary independent control of the wheel slides is provided.

Each wheel slide mounts one or more 30-inch diameter grinding wheels as the nature of the job requires. The type of work-holding equipment furnished also depends on the job. Chucking arrangements on a single work head, or equipment for holding the work on centers, can be supplied.

Two-rate automatic feed assures availability of optimum conditions for rapid stock removal, workpiece accuracy and finish. Wheel feed

NOW . . .

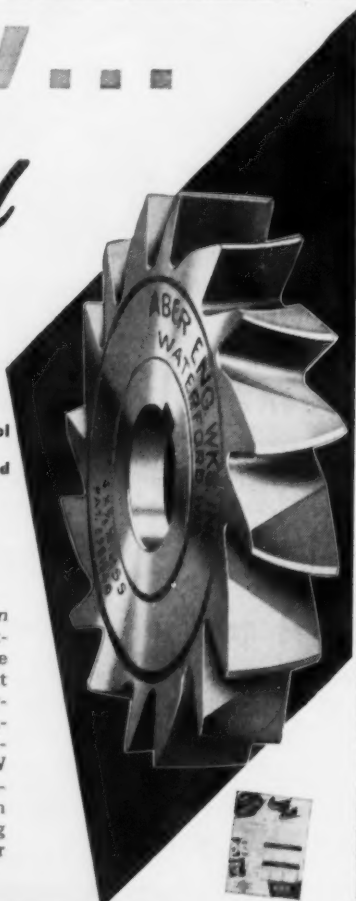
ABER

Curved Tooth

MILLING CUTTERS

1. Give More Accurate Control of Limits and Finish
2. Elimination of Chatter and Breakage
3. Extended Cutter Life
4. Better Performance
5. Increased Production

Patented Curved Tooth Design of all Aber Cutters permits faster, easier operation, because the curve of the tooth face is built up and strengthened at the corner of the tooth which first enters the cut. This makes possible a *SHEARING ACTION* and eliminates the shock of contact with the work. Dissipation of heat is faster, eliminating friction. . . . Write today for complete information.



**ABER ENGINEERING
WORKS**

WATERFORD, WISCONSIN

FREE DATA

on "How to Sharpen Curved Tooth Milling Cutters" Helpful Cutter Sharpening instructions for your grinding room.

For more data circle 443 on Reader Service Card

The WIEDEMANN METHOD

Cuts Piercing Costs

60 to 90%

Because ONLY a WIEDEMANN combines:



A Punch Press
(PIERCING SPEED)

+

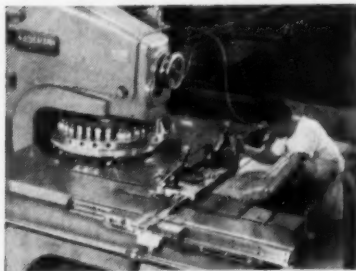


Punches and Dies in Turrets
(NO SETUP)

+



Work Locating Gauge
(NO LAYOUT)



Capacities from 7-½ to 150 Tons
Throat depths from 12" to 60"

● INCREASED
PRODUCTION



● REDUCED COST

● MAXIMUM
FLEXIBILITY

Get the facts—send drawings of your work for a free time study or write for Bulletin 101.

WIEDEMANN MACHINE COMPANY

4219 Wissahickon Ave. P.O. Box 6794 Philadelphia 32, Pa.

For more data circle 444 on Reader Service Card

January, 1956

modern machine shop 249

new shop equipment...

handwheels with "click-count" indexing mechanisms, which permit feed adjustments in increments of "tenths" without visual attention, simplify size control in set-up and initial operation.

JIG BORING

and

Large Precision Machining

Done to your specifications

We Have 16 Jig Borers

KIDDE PRECISION TOOL CORP.

15 LOCUST AVENUE, ROSELAND, N. J.

For more data circle 445 on Reader Service Card

REID

TOOL ROOM ACCESSORIES

CONTROL BALL HANDLES



Round Plastic



Oval Plastic



Round Steel



Mushroom Plastic

Round and oval plastic ball handles can be supplied in black and red plastic as preferred. The REID line includes scores of other needed tool room items. Write for Big FREE Catalog.

FREE

NEW 60-Pg.
CAT.

REID TOOL SUPPLY CO.

Muskegon Heights, Michigan

For more data circle 446 on Reader Service Card

250 modern machine shop

Individual push-button operated jogging control of wheel slide movement aids production by simplifying size control during regular operation. The increments of jogging control are adjustable, and all wheel slide feeds occur with unusual repetitive accuracy due to metal-to-metal contact of the revolving screw, wheel feed mechanisms.

Automatic wheel truing by wheel guard type devices assure efficient, effortless performance of the truing function. These devices provide the additional advantages of operating consistently at predetermined speed and feed. This is said to reduce wheel cost per workpiece ground by making possible close, uniform control of the amount of abrasive removed from the wheels. Compensation of wheel slide setting for the amount of wheel diameter reduction after truing occurs automatically. For more data circle 80 on Reader Service Card

UNIVERSAL VERNIER CALIPER

Alina Corp., 401 Broadway, New York, N. Y., has announced the Etalon No. 17 Universal Vernier Caliper which is solidly constructed of lifetime hardened stainless steel. Deeply and finely machine-divided graduations are claimed to permit easy and instant reading. The wide hand-fitted vernier slide permits smooth, snug operation.

STANDARDIZED MICRO DRILL GUIDES

All standard body styles available with hole sizes from $\frac{1}{80}$ to $\frac{1}{32}$ ". Tolerances of .0002 maintained on I.D., O.D., and concentricity.

ENGINEERED MICRO-TOOLING, DRILLS,
JIGS, COLLETS, ETC.

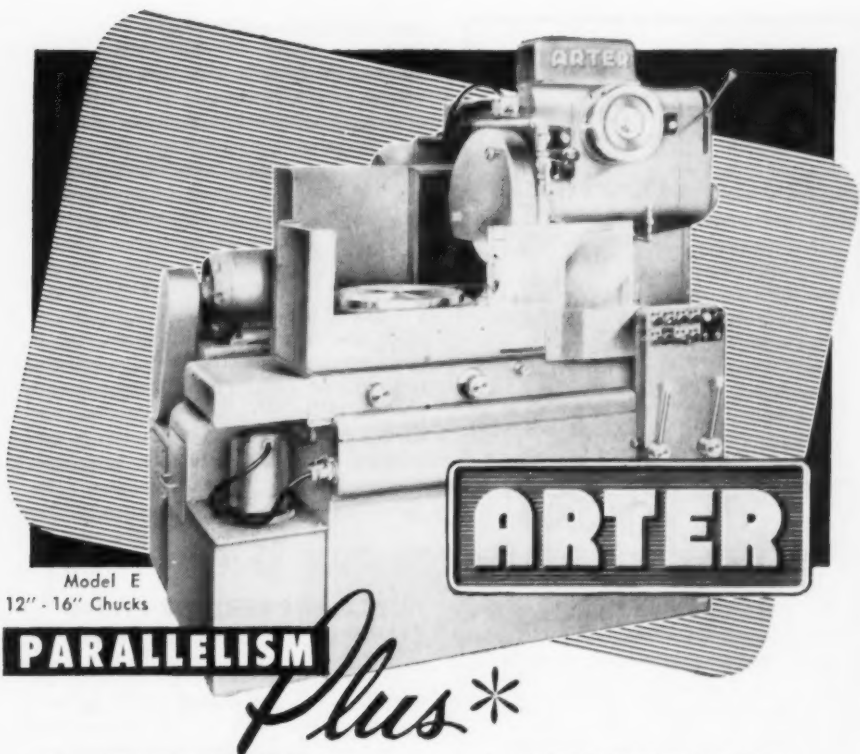
MICRO
DRILL
GUIDE



3980
Superior Ave.,
Cincinnati 36,
Ohio

For more data circle 447 on Reader Service Card

January, 1956



Model E
12" - 16" Chucks

PARALLELISM

*Plus**

- * **MANUAL and AUTOMATIC**
controlled hydraulic operation
to work table. Can be arranged for
complete automatic cycle grind.
 - * **TABLE MOUNTED Diamond Dresser**
with dial control.
- * **STEPLESS VARIABLE SPEEDS**
to table and chuck rotation.
Tiltable chuck.
 - * **HAND and AUTOMATIC
WHEEL FEED**
with power retraction.

Model E Hydraulic Rotary Surface Grinder (12 and 16" Chucks) has taken an honored place in the Arter Family of Machines after attaining a record of performance to which we point with pride.

ARTER GRINDING MACHINE COMPANY

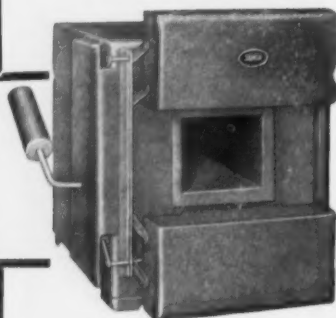
WORCESTER • MASSACHUSETTS

Jigmatic Automatic Tape Controlled Positioning Table • Rotary Surface Grinders
Flat Circular Cutter Grinders • Internal Grinders • Cylindrical Grinders • Carbide Tool Grinders

AGENTS IN INDUSTRIAL CENTERS OF UNITED STATES AND CANADA

For more data circle 448 on Reader Service Card

"Do-It-Yourself" Pays Off In Heat Treating



Why let someone else set your production schedules? If you now depend on outside heat treat sources, consider all the advantages of heat treating tools, dies, parts, etc., right in your own shop with a versatile TEMCO electric furnace. No bother with time-wasting pickup and delivery of work . . . no downtime while waiting for it to come back. Saves hours on jobs. Cuts costs . . . for TEMCO furnaces are economical to own and operate. Easy to hook up . . . easy to use. Eight models with chamber sizes from 4" x 3 3/4" x 3 3/4" to 9 1/2" x 8 1/2" x 18". \$60 to \$561.50. Write for data and nearest dealer's name.



ELECTRIC FURNACES
Thermo Electric Manufacturing Co.
488 Huff St., Dubuque, Iowa

For more data circle 449 on Reader Service Card

252 modern machine shop

new shop equipment . . .



Etalon No. 17 Universal Vernier Caliper

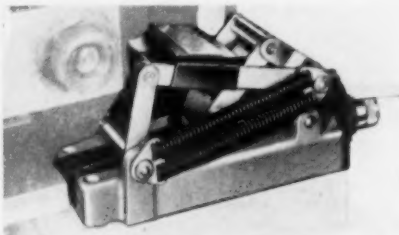
Both the vernier and the scale are in dull chrome non-glare finish which will not chip or peel. The caliper is available in either English or English and Metric graduations. The Etalon No. 17 is supplied in a handsome, especially designed contour case.

For more data circle 89 on Reader Service Card

★ ★ ★

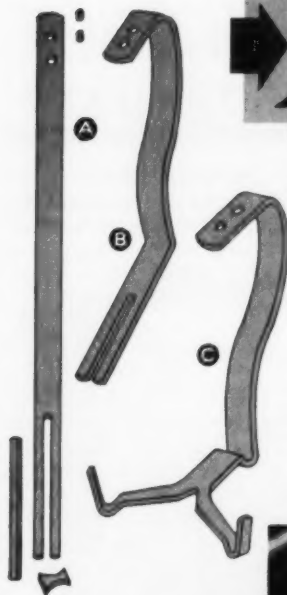
AUTOMATIC FEED FOR COILED STOCK UP TO 2 INCHES WIDE

Designated as the Jaco-Matic, an automatic feed for coiled stock up to 2 inches wide, with a maximum feed stroke of 2 inches, has been announced by Jaco Devices, Inc., 98 High St., Hingham, Mass. According to the manufacturer, the feed has a micrometer adjustment to control length of feed travel to an accuracy of 0.001 inch. Simple design and rugged construction are said to make the feed durable for long, continuous runs. The

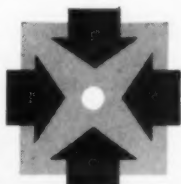


Jaco-Matic Automatic Press Feed in use

January, 1956



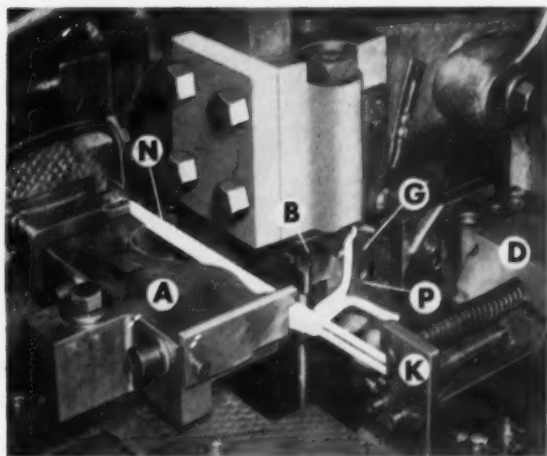
Stand is zinc-plated steel strip 0.05 in. thick by 0.625 in. wide . . . made in steps A, B and C.



Top performance in MASS PRODUCTION

60 vaporizer stands per minute . . . automatically formed in one operation on an A. H. Nilson combination press and 4-slide. Kaz products are proof that clever product design, combined with precision tooling by Nilson, increases production and lowers costs.

Without obligation, Nilson provides specific forming recommendations from detailed information. Send for A. H. Nilson catalogue . . . the first step to increased production.



Final step in forming Kaz stands on Nilson 4-slide. Feet are spread, bent, crimped (G) with workpiece (P) on centerpost while next piece (N) is being cut off. Stop (K) on right slide (D) backs off after cut and workpiece (P) is wrapped around centerpost by die (A) when finished part is clear.

A.H. NILSON
MACHINE COMPANY

1514 RAILROAD AVE. BRIDGEPORT 5, CONN.

For more data circle 450 on Reader Service Card

new shop equipment . . .

feed unit is powered by the press ram and feeds on either the up or down stroke. Its tungsten carbide steel blade normally lasts for the life of the unit because it lifts clear of the stock on the return stroke. This feature, it is claimed, also permits the feed to be used for feeding soft stock without

marring. The Jaco-Matic can be easily installed on any mechanical, hydraulic, compressed air or electric press. For more data circle 90 on Reader Service Card

★ ★ ★

CHUCK-TYPE FLOATING HOLDER

A chuck-type floating holder which, it is claimed, can be used without danger of breakage or the need for costly replacement parts is the first of its recently-

acquired Barnaby line of screw machine and turret lathe tools to be improved by Hamilton Mfg. Co., 300 Hamilton St., New Haven, Conn. The tapered shank part of the holder, formerly made in two sections, is now made in one piece, with the tapered shank brazed to the nose plate. Another feature is the use of a Jacobs chuck as standard equipment.

According to the manufacturer,

KEEP YOUR MACHINES LEVEL



With

EMPCO

leveling jacks!

For peak efficiency and longer life, level your machines with EMPCO Jacks! Easily installed and re-located, EMPCO Jacks provide quick, easy machine set-ups *plus* smooth, positive adjustment! Used with VI-SORB mounting pads, Empco jacks control vibration, reduce noise, prevent creepage and cut machine maintenance costs! In many cases they eliminate the need of anchor bolts in installations.

Available in six styles and 25 models, Empco's are designed to meet your requirements. Write today for complete information and illustrated bulletin!



THE ENTERPRISE MACHINE PARTS CORPORATION

2715 JEROME AVENUE • DETROIT 12, MICHIGAN

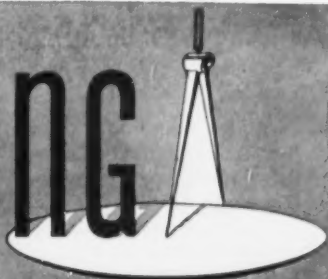
For more data circle 451 on Reader Service Card



Hamilton Chuck-Type
Floating Holder

to economize
STANDARDIZE
with

RING



precision PUNCHES and DIES



Ring Standardized Punches and Dies offer cost saving dependable performance for all of your perforating problems.

Precision volume production to rigid specifications offers

- ★ Low cost
- ★ Complete interchangeability
- ★ Immediate shipments from stock on Standards plus prompt delivery on Specials
- ★ High quality — long life

MANY SHAPES AND TYPES



ROUND



SQUARE



OBLONG



HEXAGON



RECTANGULAR

Blanks — Pilots — Headless — Shoulder and Bevel Head Quills — Slug Ejector Punches — Transfer Punches

NEW!

Tough — Accurate Retainers for Ring Punches and Dies mount easily to your die set. Available in Key Type for irregular shapes.

WRITE FOR OUR ILLUSTRATED CATALOG



RING PUNCH & DIE COMPANY

19 FENTON PLACE

JAMESTOWN, N. Y.

For more data circle 452 on Reader Service Card

new shop equipment . . .

the Barnaby line of chuck-type floating holders achieve perfect alignment of drills, reamers, counterbores and similar tools, and are used to eliminate the use of bushing blanks. Eight popular sizes are available, ranging in capacity from 0 to 1/2 inch. Screw holes in the

chuck flange are larger in diameter than the screws, permitting the chuck-hold cutting tool to be brought into alignment with the work. The holder is finished by the Du-Lite process to assure rust resistance and to provide long active life.

For more data circle 91 on Reader Service Card

★ ★ ★

NUMERICAL SEQUENCE PROGRAMMER INCREASES LATHE VERSATILITY

Automatic electronic sequence programming equipment providing increased versatility for Monarch lathes has been developed by The Monarch Machine Tool Co., Sidney, Ohio. The numerical sequence programmer makes available easily selected, fully automatic work cycles for volume production of precision pieces. While this equipment is presently arranged to actuate the well-known Monarch Series EE 10-Inch Lathe, it can be made applicable to any appropriate lathe in the Monarch line.

Key unit in the numerical sequence programming equipment is the electronic control panel. This panel incorporates simple push-type selectors which are used to preset the various operations desired from the machine for the particular workpiece to be turned. Once the proper sequence is programed with the selectors, a touch



POLIO
isn't licked yet!

Join the
**MARCH OF
DIMES**

January 3 to 31



**LEAK PROOF
AIR GUN**

Precision made of Bar Brass
and Stainless Steel

*Air-o-chek
TRADE MARK*

No packing gland — no
external levers or buttons. Easy
to use. Unequalled for long service, depend-
ability and low maintenance. Order sample on approval.

AIR-WAY PUMP & EQUIP. CO.
1046 N. Kilbourn
Chicago 51, Illinois

Patented

For more data circle 453 on Reader Service Card

CUT OUT CHATTER CHATTER CHATTER CHATTER



GRIND WITH

RED-E

PRECISION
ANTI-FRICTION

CENTERS

—and eliminate down-time changing wheels,
diamonds and coolants—have micro finish, *always!*

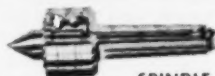
Grind with RED-E and be sure!

- | | |
|--------------------------------|---|
| 1. ABEC-7 spec. bearings. | 5. Lubricant sealed-in-for-life. |
| 2. High speed steel points. | 6. Labyrinth enclosure. |
| 3. Locked-in bearing assembly. | 7. Accuracy guaranteed to within less than .00005" T.I.R. |
| 4. Short overhang. | |

TWO TYPES FOR YOUR NEEDS



SHANK TYPE



SPINDLE TYPE

TAPERS AVAILABLE

Morse	B&S	Jarno	Norton	Landis
1 to 6	5 to 15	4 to 20	10 to 16	.8125, 1.335, 1.750
2 to 7	7 to 18	6 to 20	10 to 24	.8125, 1.335, 1.750
Special heads, tapers, shanks and points made to order.				

New grinder center catalog now available! Call your RED-E Industrial Distributor NOW!

CENTER Specialists Since 1908

RED-E TOOLS

READY TOOL COMPANY

540 Iranistan Ave.

Bridgeport 5, Conn.

For more data circle 454 on Reader Service Card

January, 1956

modern machine shop 257

new shop equipment...



Illustration showing Monarch lathe equipped with Numerical Sequence Programmer

of the start button by the operator sets in motion up to five automatic work cycles using as many as five varied spindle speeds and five different feed rates. Any number of identical workpieces may be turned in succession without further adjustment of the control panel. Functioning in conjunction with the electronic control panel is an analog to digital converter connected to the machine's carriage motion. The converter sends electrical impulses to the control circuits at precise points in the automatic work cycles, thus actuating the various operations called for by the panel selectors.

Changing the programer from one sequence of automatic operations to another completely different sequence is both fast and simple. All that is required is a revision in the setting of the control panel selectors. The selector settings can be changed manually by the foreman or operator; a master board can be used which will simultaneously depress the required selectors when placed in contact with the control panel; or punched cards computed by the plant methods department can be slipped over the selectors to show, through the punched holes, the exact pattern that is to be set for a given operation.

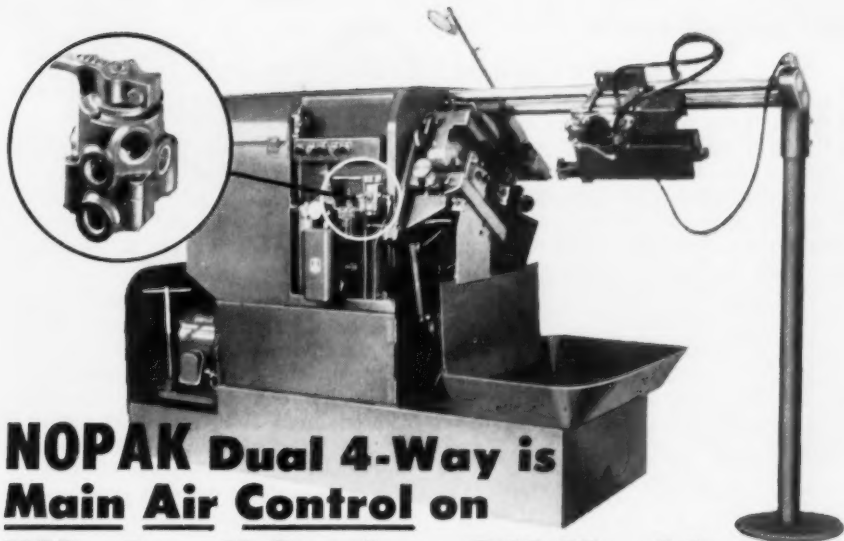
A special control cabinet is utilized to mount the electronic control panel and related electronic equipment. Casters attached to the cabinet base enable the operator to move the unit to suit his convenience. All electronic components housed in the control cabinet are arranged on removable plug-in chassis. This greatly simplifies servicing and maintenance by allowing the quick installation of a duplicate chassis while the original assembly is being worked on. As a safety measure, all plug-in chassis are electrically interlocked so that the removal of any chassis from the cabinet will immediately shut off the machine.

The air gage tracer used with the numerical sequence programer incorporates a dual template system. With

<p>ANGLE VISES 6 JAW SIZES</p> <p>SIZES 1 1/2" 2 1/2" 3" 4" 6" 8"</p> <p>Jaws with SWIVEL BASES</p> 	<h1>PALMGREN</h1> <p>for MILLING MACHINES, DRILL PRESSES, GRINDERS, SHAPERS...</p> <p>64 different models and types of vises, rotary tables, milling attachments, and other machine tool accessories.</p> <p>WRITE FOR CATALOG #203.</p>	<p>MILLING MACHINE VISES No. 408 and 608</p> <p>4" and 6" Jaws with or without SWIVEL BASE</p> 
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CHICAGO TOOL AND ENGINEERING CO., 8399 South Chicago Avenue, Chicago 17, Illinois

For more data circle 455 on Reader Service Card



NOPAK Dual 4-Way is Main Air Control on "Modern" Cutting-Off Machine

Modern Machine Tool Co., Jackson, Mich., uses the NOPAK Dual 4-Way valve as the "main air control valve" on its Cutting-Off Machine for these reasons:—

1. It provides the necessary sequence of operation control.
2. It is "easily mounted . . . in readily accessible position".
3. It directs air pressure either to part of the air system, or the whole system, as required.
4. With valve lever at 45°, "the operator can set the tools, with a gauge, against the stock while it (the stock) is locked in the collet".
5. In normal running position with valve lever at 90°, air is directed to other parts of system, while maintaining pressure on collet cylinder during cutting cycle.

This application may suggest how you can use NOPAK Valves and Cylinders for effective control and application of fluid power in your product, or in your plant equipment. For other suggestions see the NOPAK Application Manual.

GALLAND-HENNING NOPAK DIVISION
2758 SOUTH 31ST STREET • MILWAUKEE 46, WISCONSIN

Representatives in
Principal Cities

Write for Latest
Shelf-Stock Listings

NOPAK
® **VALVES AND CYLINDERS**
DESIGNED for AIR and HYDRAULIC SERVICE

A 8574-1/2 I

For more data circle 456 on Reader Service Card

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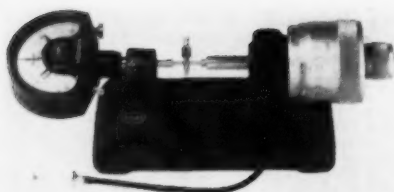
the dual template, tracer control is provided for both the last rough cut and the final finish cut. Shifting from the rough to the finish template is controlled automatically by the programmer. Automatic-positioning positive stops on the cross slide regulate rough cut depth during the automatic work cycles prior to actuation of the tracer control.

For more data circle 92 on Reader Service Card

★ ★ ★

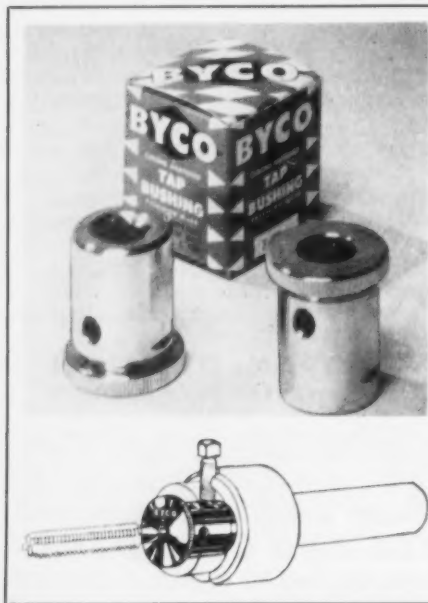
BENCH MICROMETER FEATURES NON-ROTATING SPINDLE

George Scherr Co., Inc., 200-MM Lafayette St., New York 12, N. Y., has announced an indicating bench micrometer which features a non-rotating spindle. Claimed to be ideal for maintaining close limits on small work, the



Mahr Indicating Bench Micrometer

micrometer provides an unusually good aid for fine small parts measurements, such as instruments, parts, wires, and so on, for the toolmaking, instrument making and electronic fields. The spindle and anvil have bores for holding different shapes of measuring spindles. The instrument measures by 0.0001 inch directly from the dull chrome finished oversize micrometer thimble, which is $1\frac{3}{4}$ inches in diameter and can be easily read without the aid of a magnifier. Its indicating head is graduated in 0.00005 inch with plus and



BYCO TAP BUSHINGS

Give Higher Quality Threads

. . . Less Tap Breakage

. . . Less Tap Wear

BYCO tap bushings have a square broached end to fit and drive all standard taps from No. 0 to $1\frac{3}{8}$ " and pipe taps from $\frac{1}{8}$ " to 1". Bushings are available in five o.d. sizes to fit $\frac{1}{2}$, $\frac{3}{4}$, 1, $1\frac{1}{4}$ and $1\frac{1}{2}$ in. tap holders. Chrome hardened for long life. Self-centering screws on each side of bushing lock tap securely and assure absolute true positioning.

Write today for Bulletin MS

BYCO INDUSTRIES

2302 E. 31st St.

MINNEAPOLIS 6, MINN.

For more data circle 457 on Reader Service Card

Investigate

NEW ABRASIVE APPLICATIONS

Never Before Associated with Finishing....

RUBBER-CUSHIONED "JOB-MATCHED" STOCK ABRASIVES That Do The Work Of "Specials"!

NOW YOU CAN COMBINE OPERATIONS, REPLACE SLOWER, COSTLIER METHODS. Use the same stock "job-matched" Brightboy textures you select for special jobs to do many other kinds, too.

UNBELIEVABLE? Perhaps. But it's true! Not until you have tried Brightboy and witnessed its unique rubber-and-abrasive action can you appreciate the completely new, wider concept which it has pioneered in finishing.

Brightboy BURRS, CLEANS, FINISHES, POLISHES—frequently in one operation. It is available in both Silicon Carbide and Aluminum Oxide grains, each in combinations of grain sizes and textures from extra fine to extra coarse, in soft, firm and tough rubber binders. Its versatility and adaptability will amaze you.



Brightboy is also made in a full range of accessory products: Rods, sticks and blocks for machine and manual operations.

BRIGHTBOY INDUSTRIAL DIVISION
WELDON ROBERTS RUBBER CO.

95 North 13th Street • Newark 7, N. J.

America's Pioneer Manufacturer
of Rubber-Banded Abrasives



DIAMETERS TO 8"

Ask your dealer to recommend the readily available Brightboy stock abrasives best suited to your work, and also for the new Brightboy catalog. Write us if he cannot supply you, or with regard to any problem in which finishing is involved.



For more data circle 458 on Reader Service Card

new shop equipment . . .

minus 0.002 inch range, resulting in a total range of 0.004 inch.

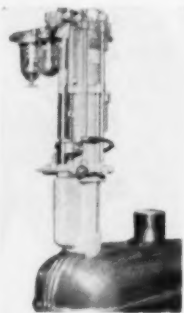
As a comparator, the micrometer can be set without additional standards. A unique cable release retracts the anvil instantly for rapid repeat measurements. Zero adjustment is accomplished by means of a fine adjustment screw

located outside the housing. Two tolerance hands can be quickly adjusted to any decided plus and minus tolerance. For more data circle 93 on Reader Service Card

★ ★ ★

FEED CONVERTS DRILL PRESS INTO PRODUCTION MACHINE

General-Pacific Corp., 8740 Washington Blvd., Culver City, Calif., has announced a drill feed which is designed to convert any drill press into a high-production automatic machine for drilling, tapping, reaming, threading, counterboring, spinning, spot facing, fly-cutting and many other operations. The work cycle of the air-operated and hydraulically-controlled drill feed is started by means of a foot pedal.



General-Pacific Drill Feed mounted on drill press for automatic production operation



COAST-TO-COAST
Time SAVING!
Wheel SAVING!
Tool SAVING!

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TOOL
GRINDERS

STANDARD builds a carbide tool grinder for every job "in the book" grinders time-tested by industry for 4 decades! Ask for Literature

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GRINDERS AND MACHINE TOOLS
2487 RIVER ROAD
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For more data circle 459 on Reader Service Card



Type 14 TD Wet or Dry
Twin Wheel Carbide
Tool Grinder
6"-10" & 14" Wheels



Type 10 T Wet or Dry
Single Wheel
Tool Grinder
6"-10" & 14" Wheels

Also mfgs.
of Variable
Speed Grinders;
Polishers and
Buffers; Super
Precision
Spindles,
Lathes and
Spec.
Machinery



Type 67
Vari-Tool
Finisher
6" Wheel
With
Abrasive
Belt

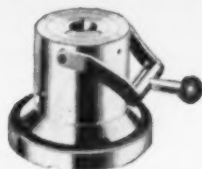


Zagar Tools

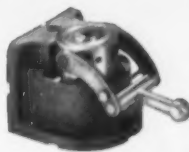
HOLD YOUR WORK—AND YOUR BUSINESS!



Collet indexing fixture



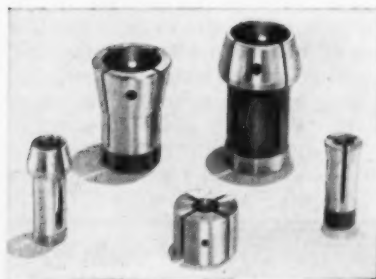
Collet holding fixture



Vertical-horizontal
collet fixture

ZAGAR HOLDING and INDEXING FIXTURES

Zagar fixtures offer you a most inexpensive way to machine small parts. Set-up is speeded and much special tooling eliminated. Slot milling, straddle milling, drilling, tapping and grinding of small pieces can be done most profitably with Zagar fixtures, *available from stock.*



COLLETS, PADS, BLANKS

Five types: No. 310 Zagar Master; Nos. 2 and 6 W. & S.; No. 5-C; No. 6 W. & S. pads. All but Zagar No. 310 are standard machine tool sizes. All collets are made of oil-hardened tool steel; have flat tops for locating purposes.

Write for Engineering Sheets
"S-1" on each product.

ZAGAR TOOL, INC.

23898 Lakeland Blvd., Cleveland 23, Ohio



TOOLS FOR INDUSTRY
and SPECIAL MACHINERY

For more data circle 460 on Reader Service Card

new shop equipment . . .

Three control knobs adjust all precision operations of the unit. A fast approach is set by dial to any length from 0 to 4 inches. Drilling depth is controlled by a micrometer-type dial to an accuracy of plus or minus 0.002 inch. Dial set feed valve adjusts the



GEARS

In Stock—Immediate Delivery

Gears, speed reducers, sprockets, thrust bearings, flexible couplings, pulleys, etc. A complete line is carried in our Chicago stock. Can also quote on special gears of any kind. Send in your blueprints and inquiries.

Send for Complete Catalog No. 20

CHICAGO GEAR WORKS

440-50 N. Oakley Blvd., Chicago 12, Ill.

For more data circle 461 on Reader Service Card





CONTINUOUS HINGES

Manufactured by

AUTO MOULDING & MFG. CO.

WRITE FOR CATALOG

1114 E. 87TH ST. CHICAGO 19

For more data circle 462 on Reader Service Card

264 modern machine shop

drilling speed to any material hardness.

According to the manufacturer, there are no gears to wear and no resulting "slack" to impair accurate drilling on mass production runs. The unit does not interfere with manual operation of the drill press at any time. There are no electrical devices on the drill feed, thus it is safe to use near volatile materials. Instant hand and foot pedal release are dual safety features of the drill feed unit.

For more data circle 94 on Reader Service Card

★ ★ ★

LIGHTWEIGHT ROTARY FEED TABLE FOR HEAVY-DUTY SERVICE

Bal-Aero Products Co., 4439 Santa Fe Ave., Los Angeles 58, Calif., has announced a rugged, lightweight rotary feed table which is designed to meet the demand for modern, high-speed, heavy-duty service and production, combined with positive, fully-dependable accuracy under constant operation. The table is of all steel design and can be either mechanically or air operated. According to the manufacturer, the unit operates fast because of simple design and accurate indexing. The index gear is made of a mehanite casting and wears in, instead of out.

The outside diameter of the standard size table is 15 inches; however, it can be supplied in any diameter from 12 to 36 inches. The overall height, less



Make 3 hammers AT ONCE!

It's the NEW, easy, economical, quick way to mold your own lead hammers on a production basis with "SHUR-GRIP" handles and this COOK production mold.

Write for circular and prices

LAWRENCE H. COOK, INC.

67 MASSASOIT AVENUE, EAST PROVIDENCE 14, R. I.



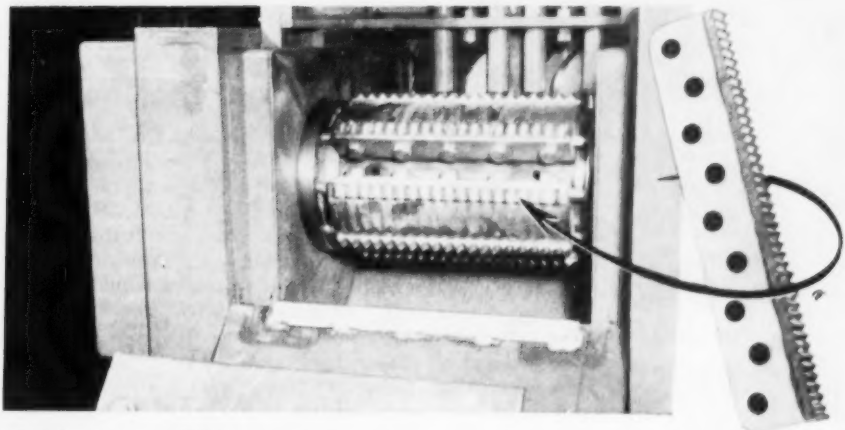
For more data circle 463 on Reader Service Card

January, 1956



DESIGN NEWS

News of Design Problems Solved with Flame-Plating



Flame-Plating cuts the cost of dicing plastics

Serrated knives such as the one shown above are used in a machine which chops plastic sheeting into tiny cubes. Although the knives are made from high-chrome, high-carbon steel, they wore rapidly which meant that costly down-time periods were needed to resharpen the blades. This problem was solved by Flame-Plating the wearing surfaces with tungsten carbide. Now, three times as much plastic material can be processed before the first sharpening is necessary.

Flame-Plating is LINDE's service performed in LINDE's plants for depositing tungsten carbide on metal parts. As the temperature of the part seldom exceeds 400 deg. F., the chance of distortion is eliminated.

For the full story on Flame-Plating, call your nearest LINDE Office today or write for your free Flame-Plating booklet.

LINDE AIR PRODUCTS COMPANY
A DIVISION OF UNION CARBIDE AND CARBON CORPORATION
30 East 42nd Street, New York 17, N. Y. **UCC** Offices in Other Principal Cities
In Canada: LINDE AIR PRODUCTS COMPANY
Division of Union Carbide Canada Limited, Toronto

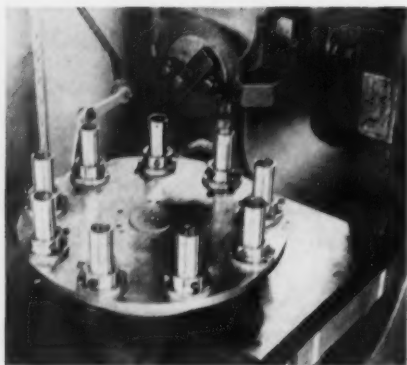


*design with
Flame-Plating
in mind*

"Linde" is a trade-mark and "FLP" is a service mark of UCC

For more data circle 464 on Reader Service Card

new shop equipment...



Bal-Aero Lightweight Rotary Feed Table

the dial plate, is $1\frac{1}{4}$ inches with a standard index of from 12 to 24 stations. The index gear measures $6\frac{1}{2}$

inches in diameter x $1\frac{1}{8}$ inches thick. All pivot points are double seal bearings and Oilite bushings.

For more data circle 95 on Reader Service Card

★ ★ ★

REDESIGNED ROTARY TABLE IS AVAILABLE IN VARIOUS SIZES

The John B. Stevens Co., Main St., Somersville, Conn., has announced a redesigned rotary table which is now available in 5, $7\frac{1}{2}$, 8, 12, 15, 18 and 24-inch sizes. All sizes are furnished in either standard or dial indexing types except the 5-inch model which is supplied in standard only. The 8 and 15-inch sizes have recently been added to the Stevens line. The design of the table features radial T-slots, center hole flush with the top surface, vertical clamping and adjustable stop screw to

Greenerd
HYDRAULIC PRESSES

for

- ASSEMBLING
- BROACHING
- FORMING
- MOLDING
- STRAIGHTENING

Hydraulic presses made to conform to J.I.C. standards. Pictured at right is 15-ton hydraulic press.
Write for Catalog 554.

GREENERD ARBOR PRESSES

NASHUA • EST. 1883 • NEW HAMPSHIRE

For more data circle 465 on Reader Service Card

BE SURE you'll meet the **SPECS**
FOR ACCURATE **ANPT** THREADS



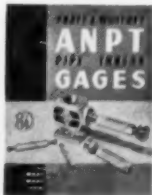
DEPEND on
PRATT & WHITNEY
ANPT TAPS AND GAGES

Here is a P&W Team that will help you produce threads that meet the rigid Military Specification MIL-7105.

P&W ANPT TAPS are correctly designed and carefully manufactured; width of crest and root flats are closely controlled. They will deliver long wear life and consistently produce threads to ANPT standards.

P&W ANPT GAGES check taper, diameter and form of the thread . . . tell at a glance if internal or external threads meet the specifications and will assemble correctly. Four different types are supplied; all are approved by the Army, Navy and Air Force as meeting their inspection requirements.

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INFORMATION



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Please send my free copy of P&W ANPT Gage Circular No. 549-1.

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FASTER GRINDING!**

kipp

AIR GRINDERS

MODEL JA
50,000 R.P.M.

\$42⁰⁰
IN U.S.A.



Weight 12 ounces;
length 6¾ inches;
chuck size ¼ inch.
Wheel guard removed
for better illustration.

The RPM's stay up while grinding . . . not only when the grinder runs idle. That means better work—longer wheel life.

High speed grinding with small wheels was a Madison-Kipp development of the late twenties. It was born out of a pressing need in our tool room. Because tool room grinding problems are universal, we believe it will pay you to utilize Kipp grinders in your tool room as generally as we do in our own.

kipp

MADISON-KIPP CORP.

208 Waubesa St., Madison 10, Wis., U. S. A.
For more data circle 467 on Reader Service Card

268 modern machine shop

new shop equipment . . .



Stevens 15-Inch Standard Rotary Table

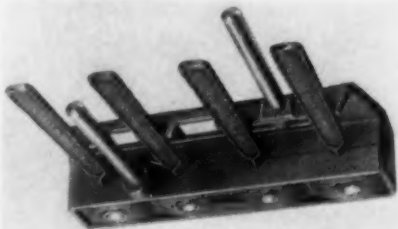
position engagement of the worm. The worm and worm gear are submerged in a bath of oil which is protected from contamination of dirt, dust, chip and foreign material by the closed design. Construction is said to be simple and sturdy.

For more data circle 96 on Reader Service Card

★ ★ ★

LEAD HAMMER PRODUCTION MOLD

All users of lead hammers can now make four 1 and 2-pound hammers in their own shop with one pouring of lead with a lead hammer production mold being marketed by Lawrence H. Cook, Inc., 67 Massasoit Ave., East Providence 14, R. I. According to the manufacturer, the production mold allows quick, economic production of



Cook Lead Hammer Production Mold

January, 1956

Convert your DRILL PRESS *into an Automatic!*

SINGLE OR  MULTIPLE SPINDLE

SET RAPID APPROACH

to any length up to 4" + stroke with rapid cycle dial. Saves time. Ideal for jig tumbling.

SET DRILLING SPEED

to material hardness with Feed Valve Dial. Adjusts to an infinite range of speeds. Increases drill and tap life.

ADJUST DRILLING DEPTH

to .002 plus or minus accuracy with micrometer type Depth Dial.

MANUAL LEVER CAN BE USED ANYTIME for manual drilling or guiding in jig tumbling.

**FOR DRILLING • TAPPING • REAMING • THREADING
COUNTER BORING • SPINNING • SPOT FACING • FLY CUTTING**

AIR OPERATED AND HYDRAULICALLY CONTROLLED, the General Automatic Drill Feed is a precision instrument. Carries warrantee of parts. Has operated continuously for over 10 years without replacement of parts. Hand and foot pedal release provide dual safety factor. Write for complete facts and new reduced prices to General-Pacific Corporation, 8740 Washington Blvd., Culver City, California.

GENERAL AIR OPERATED-HYDRAULIC CONTROLLED
Multi-Speed DRILL FEED

For more data circle 468 on Reader Service Card

new shop equipment...

four small lead hammers on the famous Cook Shur-Grip handles as the handles may be used for continuous remolding. The Shur-Grip handle safely holds the hammer head firmly and helps to keep the head in shape. A production mold which makes 3, 4, 5 or 6-pound hammers in one operation is also available.

For more data circle 97 on Reader Service Card

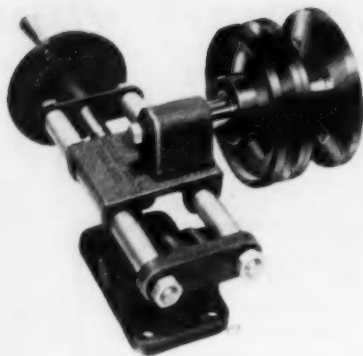
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CONTROL BASE FOR USE WITH VARIABLE SPEED PULLEY

Ease of adaption to different drive configurations and elimination of the need for a pivoted motor mount to maintain belt tension in most applications are two features of a control base,

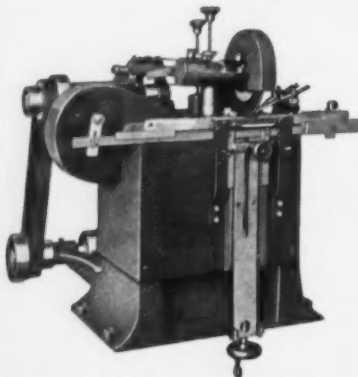
Hi-Ratio Variable Speed Pulley Unit

identified as the Hi-Ratio, developed for use with the recently marketed compound-type variable speed pulley announced by Equipment Engineering Co., 2853 Columbus Ave., Minneapolis 7, Minn. According to the manufactur-



PAYS for ITSELF

**By Getting up to Six Times More Service
from your Hack Saw Blades**



Think of the money Wardwell EC Combination Grinder will save you—increases hack saw life as much as six times.

Wardwell Model EC Combination Grinder is the only single unit grinder adaptable for hack, band and circular saws that does not depend on the shape of the grinding wheel to form the shape of the tooth. This unique feature enables the operator to grind a variety of blades without dressing or changing wheels.



WARDWELL

MANUFACTURING CO.

3803 Ridge Rd., CLEVELAND 9, O.

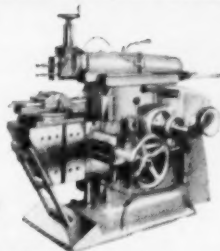
Maker of largest line of saw and tool sharpening machines

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KLOPP SHAPERS

Production-proved
in 125 top plants

You can't
buy a
better shaper
at twice the price



Model 600 with 24" stroke. Only \$3,815

MODEL	STROKE	PRICE
No. 300	11-3/4"	\$1,540
350	13-3/4"	2,000
425	16-3/4"	2,390
525	20-1/2"	2,580
600	24"	3,815
Hydraulic Models: 26", \$5,395; 33-1/2", \$7,015; 39-1/2", \$7,820.		

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KURT ORBAN COMPANY, Inc.

40 Exchange Place, Jersey City, N. J.

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ONE FOR
YOUR
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Piloted

Special Lengths

Special Diameters

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STRAIGHT OR TAPER SHANK

Send drawings for Prompt Quotations

SCHMARJE TOOL & ENGINEERING CO.

Carbide Reamers • Form Tools

MUSCATINE 3, IOWA

For more data circle 471 on Reader Service Card

January, 1956

LIVE CENTER
ACTION WITH
DEAD CENTER
ACCURACY

USE



**ANTI-SCORING
LUBRICANTS**



**PROVE IT TO
YOURSELF IN
YOUR OWN PLANT FOR ONE
DOLLAR AND THIS COUPON!**

Free-running on dead centers—with COMPLETE protection. CMD Lubricants are CONCENTRATED, form a "tough" film—absolutely NO GALLING or SEIZING—under the heaviest load. STABILIZED for added "oiliness" giving longer, smoother runs without slip-stick action. It all adds up to LIVE CENTER ACTION with DEAD CENTER PRECISION. The bigger the job, the better you'll like it.

**TRIAL ORDER—
TWO FOUR OZ. TUBES \$1.00**

Send me my order of CMD right away!

Bill me ☐ Bill my company ☐

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For more data circle 472 on Reader Service Card

modern machine shop 271

new shop equipment . . .

er, the unit can be successfully installed on spinning lathes, wire cutters and strippers, honing machines and other equipment requiring variable speeds for efficient operation. The Hi-Ratio pulley is needle bearing mounted on a hardened and ground countershaft. Speed variation as high as 6.8 to 1 is accomplished by moving the counter-

shaft between the driving and driven sheaves, with movement toward the driver reducing the driven speed and movement away increasing it.

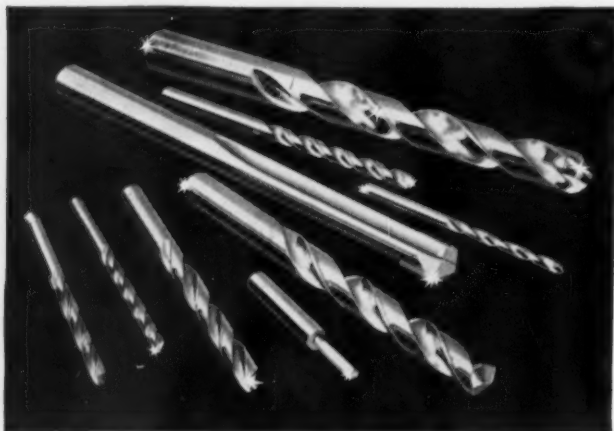
For more data circle 98 on Reader Service Card

★ ★ ★

HEAVY-DUTY WHEEL DRESSER

J & S Tool Co., Inc., 871 Dorsa Ave., Livingston, N. J., has announced a heavy-duty "Form Master" Wheel

Dresser which is designed to accommodate up to an 8-inch convex radii on an 8-inch wheel and up to a 12-inch concave radii on an 8-inch wheel. According to the manufacturer, the unit is built to meet the needs for a low cost unit for close precision work. As found on other "Form Master" models, this device dresses with the diamond point horizontal to the center of the grind center of the grinder spindle.



You can drill more holes at **LOWER COST** *with*

ACE CARBIDE DRILLS!

For fast, efficient, low-cost drilling of hardened steel and abrasive non-ferrous materials, you can't beat an Ace Carbide Drill! How so? Well, one good reason is that Ace drills have polished flutes . . . an outstanding characteristic of drills produced by the Ace-originated "Ground-from-the-Solid" process. And polished flutes mean keener, stronger cutting edges, finer accuracy, greater resistance to wear, lower drilling costs. So whether your application calls for a carbide tipped drill, or one that's solid carbide, make sure you use an Ace! Call your distributor today!

A 56 PAGE, illustrated catalog (No. 52-F) containing complete information on the entire line of ACE Drills and hardened H.S.S. drill blanks is yours for the asking. Send for it today!

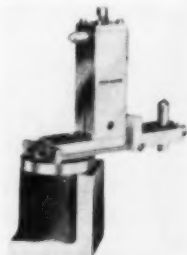


ACE DRILL

ADRIAN, MICHIGAN

ORIGINATORS OF "GROUND-FROM-THE-SOLID" DRILLS

For more data circle 473 on Reader Service Card

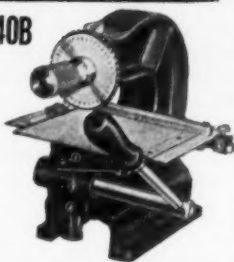


**J&S Heavy-Duty
"Form Master"
Wheel Dresser**

NUMBERALL

CUTS THE COST OF STAMPING NUMBERS

**New Model 40B
NUMBERING
AND
LETTERING
PRESS
Mono Wheel—
Automatic
Spacer**



Designed for impressing letters and numbers in all kinds of flat metal parts. Stamps plates up to 5" w. x 6" l. Carriage table advances one space with each impression of the dial, like a typewriter, doing rapid work, even spacing and perfect alignment. Different size dials are interchangeable. Direct sight gauge facilitates stamping in the proper space. Write for Bulletin MS40B.

**NUMBERALL STAMP & TOOL CO.
HUGUENOT PARK STATEN ISLAND 12, N. Y.**

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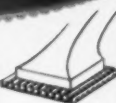
Put machines on ISOMODE® PADS



✓ to absorb
vibration

✓ reduce noise

✓ cut maintenance



Economical, effective mounting — 1 sq. ft. enough for 4 tons of machine weight. Neoprene — lasts for years, 5/16" thick, 18" square, ten to the standard package. Easily cut to shape and installed under most machines — big punch presses included. No cementing necessary. Write for Bulletin No. 415.

B M Manufacturing Company

A division of Tectron American, Inc.
1067 State Street, New Haven 11, Conn.

For more data circle 475 on Reader Service Card

NEW LEITZ

TOOLMAKER MICROSCOPE

...PRODUCES HIGHEST PRECISION
...CUTS INSPECTION TIME

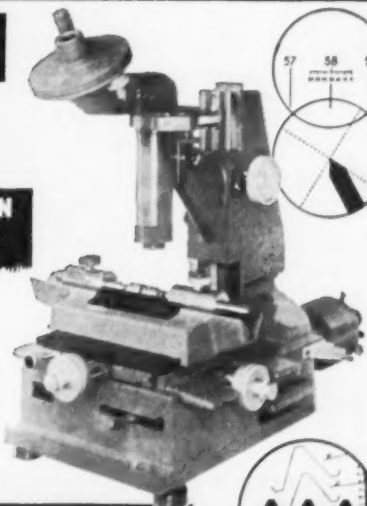
The NEW LEITZ DESIGN checks angular measurements in degrees and minutes.

Contains all Thread Templates for U.S. National thread profiles 4-80 pitch.

Contains Radii Templates from 21/64" to 13/16" by 1/64". Concentric circles from .010" to .280" by .010" and one blank compartment.

NOTE: TEMPLATES CAN BE OBSERVED IN 3 MAGNIFICATIONS: 10X - 20X - 30X

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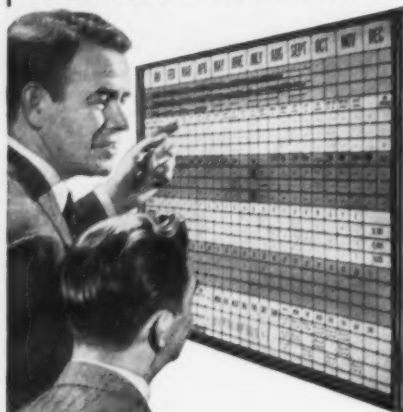


Geo. SCHERR OPTICAL TOOLS, Inc.

200-MM LAFAYETTE STREET • NEW YORK 12, N. Y.

For more data circle 476 on Reader Service Card

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- ☆ Simple to operate — Type or Write on Cards, Snap in Grooves
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GRAPHIC SYSTEMS

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new shop equipment...

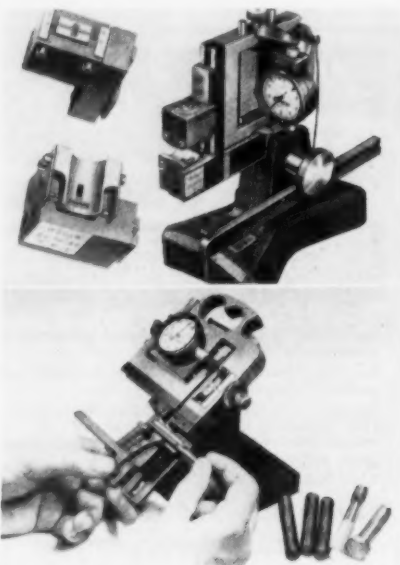
Sealed ball bearings ensure smooth operation and lasting durability. With the exception of the base, all parts are hardened and ground. Drilling and tapping of holes are possible in the cast iron base when needed for quick set up on cylindrical grinders.

For more data circle 99 on Reader Service Card

★ ★ ★

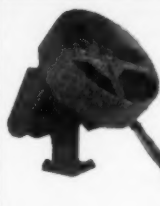
INSTRUMENTS MEASURE PITCH DIAMETER AND CHECK LEAD OF THREADS

An instrument for the measurement of pitch diameter of threads and another for lead checking have been announced by Standard Gage Co., Inc., 64 Parker Ave., Poughkeepsie, N. Y. Both instruments utilize the Versa-



(Above) Standard Three-Wire Measuring Gage. (Below) Standard Lead Checker

For more data circle 477 on Reader Service Card



PART FEEDER

Automatic Part Feeders are adaptable to production jobs requiring the handling of small parts. Parts poured into hopper are arranged and fed down track in proper order.



Single & Multiple Spindle Magazine Feed Power Screw Driving Machines

For driving screws faster in products assembled with screws. These machines operate easily and require very little attention or adjustment when put in production.

Send sample parts when writing for quotation.

COOK & CHICK CO.

2415 WEST 24TH ST., CHICAGO 8, ILL.

For more data circle 478 on Reader Service Card

MARK IRON, STEEL and CARBIDES



THE *Etchograph* WAY

Original Electric Etcher, Thousands in Daily Use Mark hardened parts, tools, dies, gages and fixtures of any ferrous metals including the hardest alloys and carbides—quickly—plainly. • Three sizes to meet all requirements.

• Write for circulars and prices.

BREWSTER-SQUIRES CO.

P. O. Box 601

Englewood, N. J.

For more data circle 479 on Reader Service Card

The ONLY Live Center On Which Points May Be Interchanged to $\pm .0001$

Points Must Be Ordered With LIVE CENTER To Achieve This Degree Of Accuracy.



Ask your local distributor or write direct for 26-page Catalog on Live Centers, Collets, Internal Collets, Draw Bars, and Turret Tool Posts.



Empire Live Centers

Quality engineered for use on lathes, grinders, and milling machines . . . Empire Live Centers are versatile, accurate, heavy duty. Tapered seats give consistent precision alignment . . . assure accuracy of .0001. Positive seal eliminates dirt, grit, cutting oils. Combination bearings absorb both radial and thrust loads.



Manufactured in all tapers: Morse, Brown & Sharpe, Jarno, and straight shank. Special shanks and points to order.

Empire Toolmaker's Set available in handrubbed American Walnut case.

ROYAL PRODUCTS, 84 Union Street, Mineola, L. I., N. Y. Pioneer 6-4245

For more data circle 480 on Reader Service Card

new shop equipment...

Dial gage as the fundamental unit. Capable of being fitted with a variety of contacting elements, the Versa-Dial can check groove diameters, shallow counterbores and a number of other kinds of dimensions as well.

Measurement of pitch diameter is

basically by the three-wire method, but with holder devices of such design that the operator of the gage need not be aware of the wires themselves. The upper wire is approximately positioned by two plungers, which automatically recede under the effect of the gaging action. Lower wires are separated slightly by collars but are limited as to maximum spacing. Wires are of tungsten carbide for most pitches. Measuring

pressure is adjustable but constant for given setting. Therefore, the pressure is the same on the workpiece as on the master and is independent of judgment. Six sets of interchangeable jaws cover a range from 56 to 10 t.p.i. and diameters up to 1 inch. The gage is regularly furnished with a dial indicator graduated in 0.0001-inch increments. The indicator may be faced in the direction desired. Recommended is a knee-operated mechanism which separates the jaws.

The other innovation, the lead checker, utilizes jaws carrying vee edges and capable of being attached at any desired spacing, the setting being facilitated by a fine adjustment screw.

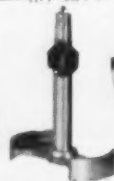
Did you know that ---

The odds are 2 to 1 that the transmission in your new car was gaged by Comtorplug



Precision Internal Gage

SIZES FROM
 $\frac{1}{8}$ " to 8"
AND LARGER



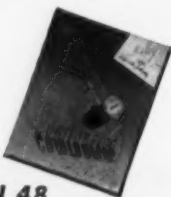
Unique Advantages

- Positive gaging accuracy to fraction of .0001" regardless of who operates it.
- Indicates actual size, a fixed—not passing—reading.
- Positive 2-point gaging—automatic centering.
- Shallow holes, deep holes, inside splines, open-end holes gaged easily.
- Detects ovality, back or front taper, bell mouth, barrel shape.
- Reaches to bottom of blind holes.
- Gages work while still held in chuck.
- A shop tool for all-day every day use.
- Portable—on wires, hoses or stands.

Investigate the gage used by the thousands in jet engine, automotive transmission, household appliance, farm machinery, guided missile and other volume-precision plants. IT MAKES PRECISION GAGING EASY... at machine... at inspection bench... for selective assembly. No other like it—investigate and see why.

COMTOR COMPANY

64 Farwell St.
WALTHAM 54,
MASS.



GET THE FACTS—REQUEST BULLETIN 48

For more data circle 481 on Reader Service Card

OLIVER 15-in. DISK GRINDER finishes aluminum and other non-ferrous metals and materials

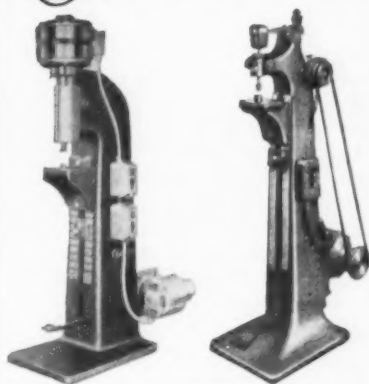


Its aloxite disk grinds aluminum and its alloys, brass, plastics, etc. smoothly. Table tilts 45° down, 25° up. Table is fitted with gauges that enable it to handle angular and circular work without fuss. Its angle adjustments with fine graduations assure accurate work. Belt grinding attachment available. Write for Bulletin #182-M.

OLIVER MACHINERY CO.
GRAND RAPIDS 2, MICH.

For more data circle 482 on Reader Service Card

GRANT RIVETERS



• Pioneers in the riveting field. Head rivets from smallest to 3/4" diameter, either by noiseless spinning or vibrating hammer method.—Sizes to meet all needs.—Types include Vertical and Horizontal Multiple Spindles. Write for literature — and don't forget to send samples.

THE GRANT MFG. & MACHINE CO.
96 Silliman Ave. . . Bridgeport 5, Conn

For more data circle 483 on Reader Service Card



• Write today for literature on complete line of Huppert furnaces and ovens in floor and bench models.

• Ask for Hints on Heat Treating.

For Heat Treating Small Parts — HUPPERT — Deluxe ELECTRIC FURNACES

Here's a series of compact, built-in Huppert temperature controllers. All-steel construction — multi-insulation — sturdy Kanthal elements — counterweighted doors — removable porcelain tray.

Model No.	Inside Dimensions			Temp. Range	Watts 110 Volts AC	Price
	Wide	High	Deep			
434DL	4 1/4"	3 3/8"	4 3/4"	300°-1600° F.	920	\$ 86.00
439DL	4 1/4"	3 3/8"	9"	300°-1600° F.	1650	115.00
436DL	4 3/8"	3 3/8"	6"	300°-1900° F.	1650	115.00
5DL	4 3/8"	3 3/8"	9"	300°-1900° F.	1750	176.00
9DL	6"	6"	6"	300°-1900° F.	2200	200.00
669DL	6"	6"	9"	300°-1900° F.	3000	248.00
10DL	8"	4"	6"	300°-1900° F.	2000	220.00
849DL	8"	4"	9"	300°-1900° F.	3000	265.00

Available for 220 Volt AC at small additional cost.
Stainless steel housing slightly higher.

K. H. HUPPERT CO.
6841 COTTAGE GROVE AVENUE, CHICAGO 37, ILLINOIS
Manufacturers of Electric Furnaces and Ovens

For more data circle 484 on Reader Service Card

new shop equipment...

A spring-loaded lever snugs the work-pieces against the vees, and the lead variation is read directly on the indicator due to the parallel sliding action of the basic Versa-Dial unit. Jaws regularly stocked are suitable for pitches from 10 to 40 t.p.i. and diameters up

to 1 inch for American National and Unified threads. Jaws for finer or coarser threads can be furnished as special. The lead checker is ordinarily supplied with an indicator graduated in 0.0001-inch increments.

For more data circle 100 on Reader Service Card

★ ★ ★

MACHINE REPRODUCES THREE-DIMENSIONAL MOLDS AND DIES

Designated as the SR.3D, a machine which is designed for three-dimensional reproduction of molds and dies has been announced by Scripta Machines A Graver, 7 Passage Turquetil (Nation), Paris 11, France. The main part of the machine is an adjustable pantograph, since it provides for the performance of the entire reproduction operation. The pantograph is a parallelogram composed of four arms, one of which is extended to accommodate the tracing finger. This finger methodically follows the contour of the model, thus transferring its movement to the entire pantograph. At the same time, the tool, consisting of a spindle containing a milling cutter and held by a parallel arm, reproduces the exact homothetic piece, only on a smaller scale. The pantograph is adjustable by means of two knob screws, according to the reduction ratio required.

The toolholder set is a spindle, driven by a motor which can be adjusted

Accurate Hole Transfer Made Easy With **NIELSEN TRANSFER SCREWS**

Simply insert in holes, invert, strike sharply and you have centers and drill circles perfectly located. Reduce time and eliminate spoilage of other methods. 8 sizes, from 3/16" to 1/2" U.S.S. Inexpensive — Last for years.



Write for Circular
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DIE COMPANY**
P. O. Box 1067
Berkley, Mich.

For more data circle 485 on Reader Service Card

RECLINABLE POWER PRESSES



Ideal for general stamping work... 4 to 100 tons capacity. Can recline to 40° with perfect safety.

Our catalog contains a wide variety of press types and sizes. Write for it today.

*52nd year serving worldwide industry with Patent Percussion, Open Back, Double Crank, Punch, Horn, Toggle and Straight Side Presses, Dial and Roll Feeds.

ZEH & HAHNEMANN CO.
190 VANDERPOOL ST. NEWARK 5, N. J.

For more data circle 485 on Reader Service Card

READING BENCH KEYSEATER

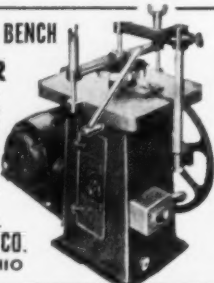
Portable—move directly to job; a time saver for both small and large shops.

3 3/4" stroke; adaptable for other work.

Low first cost — prompt delivery.

Good dealers wanted.

READING MACHINE CO.
CINCINNATI 37, OHIO



For more data circle 487 on Reader Service Card



DYKEM STEEL BLUE®

Stops Losses

**making Dies and
Templates**

Popular package
8-oz. can fitted
with Bakelite cap
holding soft-hair
brush for applying right
at bench; metal surface
ready for layout in a few minutes.
The dark blue background
makes the scribed lines show up in
sharp relief, prevents metal glare.
Increases efficiency and accuracy.

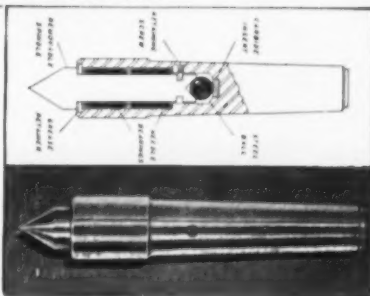
Write for sample on company letterhead
THE DYKEM COMPANY
2301F North 11th St. • St. Louis 6, Mo.

For more data circle 488 on Reader Service Card

Need Machining Precision? Get WEE LIVE CENTERS

You will find Wee Live Centers on the production lines of big name companies. They offer faster, chatter-free, accurate performance in lathes, grinders, hobbers. Runout held to .00015. Test one, learn why leading companies order and re-order. No. 2, M.T., \$21.00. Request complete price list, many sizes, tapers, shanks. Write direct, if distributor cannot supply you.

HERBERT CROSS & SON • Bala-Cynwyd 1, Pa.



For more data circle 489 on Reader Service Card



Faries

NEW R.F. IDEA INCREASES PRODUCTION!

LOUVERED SHADE eliminates shadows, reduces fatigue, ventilates dust (increasing light efficiency 30%). See cigarette test!

GREATER ADJUSTABILITY than any other fluorescent lamp made. Extends from 14" to 37". One lamp does job of two!

FRICTION-FREE design means

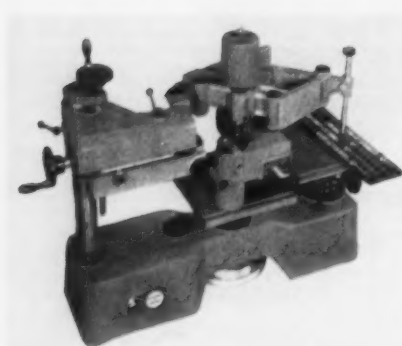
no screws to tighten. "Stays put" in any position. Completely counter-balanced by gravity. Both arm and shade rotate 360°. Entire lamp approved by Underwriters' Laboratories.

WRITE FOR FREE ILLUSTRATED CATALOG #M-1

Faries LAMP DIVISION • ELWOOD, INDIANA

For more data circle 490 on Reader Service Card

new shop equipment . . .



Scripta SR.3D Three-Dimensional Engraver

from 1,000 to 15,000 r.p.m., holding a high-speed steel or tungsten carbide cutter. The work table can be accurately adjusted vertically, and the copy-

holding table is also vertically adjustable. The machine also features a horizontal pantograph assembly movement which allows for the accurate positioning of the milling cutter and a vertical pantograph assembly movement.

For more data circle 101 on Reader Service Card

★ ★ ★

PIPE TAPS FEATURE STANDARD HAND TAP SHANKS

High speed steel ground thread pipe taps with standard hand tap shanks for use in tapping attachments have been announced by the Jarvis Corp., Middletown, Conn. According to the manufacturer, the pipe taps overcome various chucking problems by utilizing the standard hand tap shank. The taps easily fit any tapping machine or device and afford close control and precision in actual operation. Made of high speed steel, the taps are engineer-

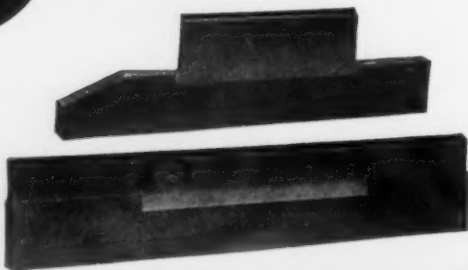


Standard thrufeed and infeed work support blades available from stock. Prices on special blades quoted on receipt of prints. We retip and regrind. Let us salvage your worn blades.

SPECIAL TOOLS

Prompt quotes on receipt of your prints.

CARBIDE TIPPED Work Support Blades for CENTERLESS GRINDERS



WILLEY'S CARBIDE TOOL CO.

SOLE MARKERS OF WILLEY'S METAL

1342 W. Vernor Highway

Detroit 1, Michigan

For more data circle 491 on Reader Service Card

TESTING?

you need the . . .

ACROMARKER

(Reg. U.S. Pat. Off.)



to stamp the tags that record your findings. "Thousands are in use for stamping name-plates, tools, machine parts, dials, instrument parts, signal system tags, tool checks, etc."

ORDER YOURS NOW

The **ACROMARK** *Company*

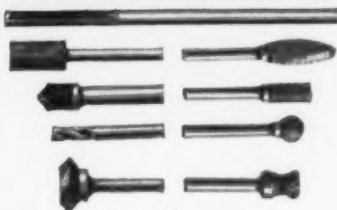
9 Morrell St., Elizabeth 4, N. J.

For more data circle 492 on Reader Service Card

ESSEX

Precision

CARBIDE & HIGH SPEED CUTTING TOOLS



CARBIDE TOOLS:

Burrs
End Mills
Reamers
Burr Sets
Special Tools

HIGH SPEED STEEL TOOLS:

Rotary Burrs
Rotary Files
Chatterless Countersinks
Special Tools

All U.S. Steel & Carbide Tools cleaned and resharpened (Write for catalogue)

ESSEX ROTARY FILE & TOOL CORP.

Makers of Fine Tools Since 1868

295 MADISON AVE.

NEW YORK 17, N. Y.

For more data circle 493 on Reader Service Card
January, 1956

Expensive
Equipment
**IS NOT
NECESSARY**
To Remove
Broken Taps



The majority of broken taps which cause such a waste of time and production—can easily be removed without resorting to expensive machines and equipment.

WALTON TAP EXTRACTORS

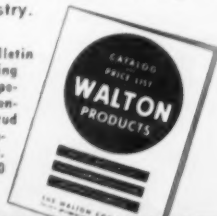
REMOVE BROKEN TAPS
QUICKLY • EASILY • INEXPENSIVELY

2, 3, 4 Flute
Styles. In sizes
No. 4 to 1 1/2"



This Specialized Walton Tool will back out most broken taps, without damage to threads or the work. Its value has been proven by its extensive and continued use throughout the metal working industry.

Send for descriptive bulletin and price list No. 10 listing these and other Walton Specialized Tools: Tap Extensions, "Reps" Pipe and Stud Extractors, and "Walton-American" Tool Holders. All tools offered for a 30 day FREE TRIAL.



The WALTON Company
HARTFORD 10, CONN.

For more data circle 494 on Reader Service Card
modern machine shop 281

Economy

... Another Word For
ACCURACY



PLUS ATTRACTIVE PRICE

For your duplication requirements in standard items, be sure to specify "ECONOMY" . . .

★ **"TRU-LOC"** Adjustable Adapter Sleeves & Nuts

★ **A. S. A. DRILL JIG BUSHINGS**

★ **A. G. D. PLUG & RING GAGES**

Always in stock to assure you immediate delivery.

Ask about our prices for salvaging your worn-out plug and ring gages.

**Catalog & Price
List Upon Request**



Economy

TOOL & MACHINE CO.

1827 S. 68th St. • Milwaukee 14, Wis.

For more data circle 495 on Reader Service Card

282 modern machine shop

new shop equipment . . .



Jarvis High Speed Steel Ground Thread Pipe Tap with standard hand tap shank

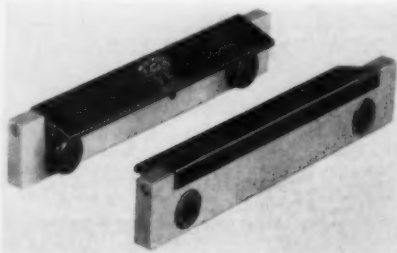
ed and ground for use in specific materials, yet are supplied as standard. Four sizes of taps with the standard hand tap shanks are available; namely, 1/8, 1/4, 3/8 and 1/2-inch sizes.

For more data circle 102 on Reader Service Card

★ ★ ★

MAGNETIC HOLD DOWNS ATTACH INSTANTLY TO VISE JAWS

Designated as the "Miti-Mite" No. 903D, magnetic hold downs which attach instantly to vise jaws in either a horizontal position or at an angle have been announced by The Lufkin Rule Co., Saginaw, Mich. Once placed in the desired position to hold the work, there is no necessity to hold them further with the hands, shims, blocks or parallels. The clamping edge is less than 3/32 inch and will hold very thin work. The back of each hold down has a slight taper, which causes the clamping edge to force the work downward



"Miti-Mite" No. 903D Magnetic Hold Downs

January, 1956

WALLS TU-WAY BELT SANDER

Full
1/3 h.p.
G. E. Motor



VERTICAL

HORIZONTAL

At last, a top quality industrial sander that provides all the most wanted features - yet sells for so little. **\$89.95**

complete with cord, plug, switch ready to use

Illustrated Literature on Request

A few desirable distributor territories still available

WALLS SALES CORPORATION
333 Nassau Avenue Brooklyn 22, N. Y.

For more data circle 496 on Reader Service Card



**Powered by the press ram...
independent of the die**

2 SIZES Cuts steel up to $\frac{1}{16}$ " thick

3" WIDE **\$69** 6" WIDE **\$95**

Guaranteed - money back if not 100% satisfied

New LOW prices
on the JACO
AUTOMATIC
STOCK REEL



**WRITE FOR FULL
DETAILS TODAY!**

Dealer Inquiries Invited

JACO DEVICES, INC.
98 High Street
HINGHAM, MASS.

For more data circle 497 on Reader Service Card

People work better when they SEE BETTER MAGNI-FOCUSER



At SKF Industries, Inc.

Magni-Focuser helps in conversion of wire into "points" for ball-point pens.

MAGNI-FOCUSER'S

matched prismatic lenses give needle-sharp magnification. Comfortably light weight. Fits over regular glasses. Leaves both hands free. Normal vision may be resumed by lifting head.

**SPEEDS PRODUCTION
With Third Dimensional (3-D) Vision
Leaves both hands free to work**

Magni-Focuser—the binocular magnifier—reduces eye-strain and prevents squinting—thereby speeding production, increasing accuracy and minimizing the chance of errors and accidents.

Gauge reading, layout work, inspection, tool and die work are just a few of the jobs that need the Magni-Focuser. Speeds precision assemblies, blue print work. Restores the usefulness of the skilled hands of many older workers whose vision needs a seeing aid.

Magni-Focuser can help your plant produce better. Immediate delivery. 10-day trial without obligation. Return to us if not satisfied. \$10.50.

Send for descriptive folder

EDROY PRODUCTS CO. 480 Lexington Ave.,
Dept. P, New York 17, N. Y.

For more data circle 498 on Reader Service Card

new shop equipment...

as the vise jaws close. A spring beneath each hold down keeps it in a horizontal position until this pressure is applied. The downward pressure is said to assure that the work will be firmly based when machining surfaces with a machine.



**DRILL and
PILOT
BUSHINGS**
Frictionless
—Rotary
For core drilling, T.
C. and high speed
boring, turret tool,
piloting, etc. Won't
stick or clog. Dust
proof as a watch.
Write for details.

GATCO ROTARY BUSHING CO.
42330 Ann Arbor Road, Plymouth, Michigan

For more data circle 499 on Reader Service Card

COOPER WEYMOUTH
VARIABLE SPEED
STOCK STRAIGHTENERS

Portable cabinet units in sizes 6" up to 24". Constant or variable speed drives with forward, reverse and cut-out switch. Five, seven or nine straightening rolls. Pinch rolls and all bottom straightening rolls power driven.



**WRITE FOR
DETAILS.**

**COOPER
WEYMOUTH
INC.**

277 NOBLE AVE. • BRIDGEPORT 8, CONN.

For more data circle 500 on Reader Service Card

284 modern machine shop

Made of hardened tool steel, the hold downs are 5 inches long, swivel mounted in a polished aluminum plate 6 inches long. The plate contains two permanent magnets spaced $3\frac{3}{4}$ inches apart. Each magnet has sufficient magnetic pull to keep the hold down in position, even if only one magnet should contact the vise jaws. The hold down can be used in all size vises, including small toolmakers' clamps.

For more data circle 103 on Reader Service Card

★ ★ ★

SEPARATOR UTILIZES SELF-CLEANING PERMANENT MAGNET

Stearns Magnetic, Inc., 664 S. 28th St., Milwaukee 46, Wis., has introduced the "Discardo" Cross-Belt Magnetic Separator which removes tramp iron and automatically discharges it away from the flow of material in a continuous operation. Suspended above a conveyor belt, chute or sorting table, Alnico V permanent magnetic components of the separator are said to create a deep, powerful magnetic field which pulls dangerous tramp iron out of the material flow. Contaminating iron is attracted to the magnet face where a cleated endless belt automatically carries it out of the magnetic field to discharge harmlessly away from the conveyor or chute. Frequent magnet inspection and hand cleaning are claimed to be eliminated.



DRILL THESE HOLES
BY A QUICK, EASY, INEXPENSIVE METHOD
Your business letterhead will bring literature.

WATTS BROS. TOOL WORKS
Wilmerding, Pa.

For more data circle 501 on Reader Service Card

January, 1956

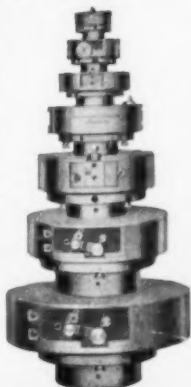
MUMMERT-DIXON FACINGHEADS

Two-way tool feed
in 9, 12, 16, 20, 24,
30, 36, 40 and 46
sizes.

One-way tool feed
in 6, 9 and 12 sizes.

Automatic feed —
convenient tool ad-
justment — quick
feed reverse. Save
time and costly set-
ups.

Write for
folder.



MUMMERT-DIXON CO.

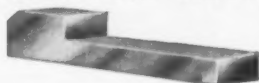
120 PHILADELPHIA ST. • HANOVER, PA.

For more data circle 502 on Reader Service Card



MARK OF QUALITY

STANDARD MACHINE KEYS



We are able to furnish the following types of fin-
ished machine keys of any size and taper: Gib
head taper keys, Plain taper keys, Straight keys,
Round end feather keys, and Tilt keys. We can
supply you quickly with the quantities you need
at the specifications you require.

Send for new catalog giving complete information
on Woodruff keys, taper pins, machine keys and
machine racks.

STANDARD STEEL SPECIALTY CO.

BEAVER FALLS • PENNSYLVANIA

Plants: Beaver Falls, Pa.; Hammond, Ind.

For more data circle 503 on Reader Service Card

CHECK YOUR BENDING PROBLEMS HERE:

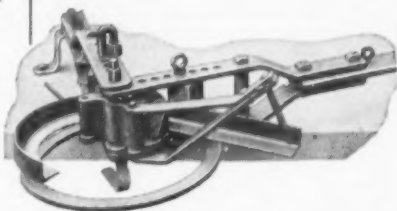
These are representative of the 101 dif-
ferent bends you can quickly set up with a

- | | |
|---|---|
| <input type="checkbox"/> Pipe | <input type="checkbox"/> Rings, Coils |
| <input type="checkbox"/> 90° Bends on
Heavywall or
Standard Pipe | <input type="checkbox"/> Centering Large
Diameter Eyes |
| <input type="checkbox"/> Steel Tubing | <input type="checkbox"/> Sharp, Square Bends
on Flat Stock |
| <input type="checkbox"/> "U" Shapes, "U"
Bolts, Square
CornerRadius "U" Bolts,
Clevises, Hooks,
Links | <input type="checkbox"/> Flat Eyes,
Automobile Spring
Eyes |
| <input type="checkbox"/> Angles, Offsets
Square Bends,
Irregular Shapes
on Flat Stock | <input type="checkbox"/> Angle Iron Flange
In or Out |
| <input type="checkbox"/> Eye Bolts, "S"
Shapes, Round or
Square Stock | <input type="checkbox"/> Flat Stock
Edgeways |
| | <input type="checkbox"/> Round or Square
Eyes on Flat
Stock, Wire |
| | <input type="checkbox"/> Conduit, Heavy
or Thinwall |

HOSSFELD

UNIVERSAL®

IRON BENDER



Get The Facts!

Write for bulletin
showing bender mod-
els, standard and
special dies, and il-
lustrations of bends.

The Hossfeld Universal Iron Bender is indispensable for maintenance and
production work in metalworking, custom welding and repair shops, industrial
and engineering plants, institutions and vocational departments in colleges,
universities, trade and high schools. It replaces special bending equipment.
A Hydraulic Attachment (optional) enables one man to bend heavier material.

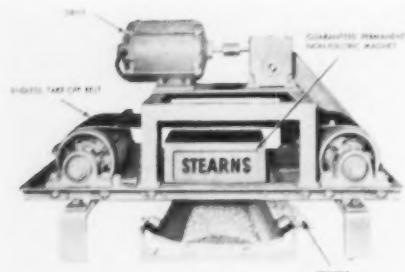
HOSSFELD MFG. CO.

402 W. 3rd Street

Winona, Minnesota

For more data circle 504 on Reader Service Card

new shop equipment . . .



Stearns "Discardo" Magnetic Separator

The separator is supplied completely assembled, including an integrally-mounted motor-reducer drive. No electric power is required other than that necessary to drive the fractional horse-

power motor. The separator is available in various sizes, suitable for suspending up to 4 inches above the material flow.

For more data circle 104 on Reader Service Card

★ ★ ★

FLOATING PLATE CARRIES RELATIVELY HEAVY WEIGHT

Using the principle of a flat air bearing, a "floating plate" which is designed to carry a relatively heavy weight and easily slide it along a flat horizontal surface has been announced by Centerline Engineering Co., 90 Crest St., Wethersfield, Conn. Its major application is for moving a heavy drill jig from spindle to spindle on the table of a multiple-spindle drilling machine. The plate contains a normally closed push-button valve which is connected

★ ★ ★ ★ ★



SETS THE PACE!

Now Offers You The
LARGEST DELIVERABLE SELECTION

**more than 22,000 SIZES,
TYPES AND SPECIFICATIONS
A.S.A. & ACE STANDARD
DRILL BUSHINGS**

Regular, Serrated, Castable,
Micro and Super-Sizes . . .
plus Specials
*Your "Specials" may be ACE
"Standards"—ask for them!*

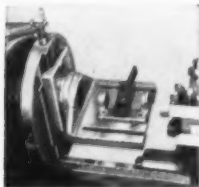
Always Specify ACE--
"STANDARD OF THE INDUSTRY"



ACE DRILL BUSHING CO., INC.
5407 Fountain Ave., Los Angeles 29, Calif.

For more data circle 505 on Reader Service Card

SLASH TOOLING COST, TIME FOR ANY MACHINING JOB



WE'LL PROVE IT WITH FREE DEMONSTRATION!

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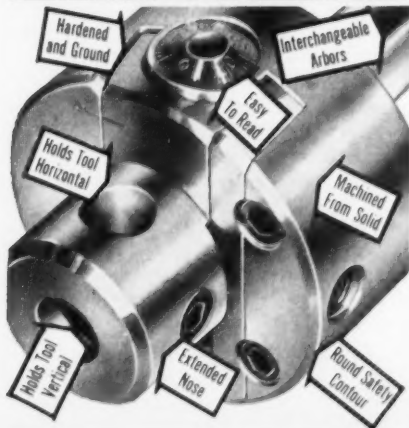


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Janua 1956



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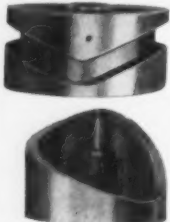
3801 Buchanan S.W.
Grand Rapids 8, Michigan

For more data circle 508 on Reader Service Card

modern machine shop 287

new shop equipment...

to the shop air line by a length of hose. When the valve is depressed, air flows through passages within the plate and out through connecting ports in the bottom of the plate, exerting a lifting force against the drill table. This lift is a few thousandths of an inch, suffi-



CAMS

All types made complete to your specifications.

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BARKER Bench Type MILL

for Production Milling
of Small Parts by
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\$295.00
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BARKER ENGINEERING COMPANY

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288 modern machine shop

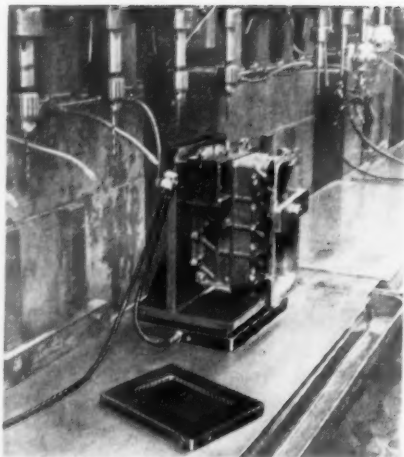


Illustration showing Centerline Model B Floating Plate (holding drill jig) and Model A Floating Plate (in foreground)

cient to float the plate and drill jig on a cushion of air until it is positioned by inserting the cutting tool in its jig bushing. The valve is then released to shut off the pressure and allow machining under rigid conditions.

According to the manufacturer, the sensitivity of the plate permits accurate positioning, particularly valuable for drilling small holes or deep holes squarely. Escaping air on all sides of the plate blows chips away. The unit is said to operate equally as well when coolant is used. The plate has no mov-

A Real Spring Winder!



Will earn its cost in one day. The Hjorth Perfection Spring Winder offers the ideal means of winding extension, compression, torsion, taper, double taper, or left hand springs. Try one in your shop. You'll like it and the price is reasonable.

No. 1 Capacity 0 thru 3/32" wire \$1.50

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January, 1956

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Countersunk — Taper
Made to Blueprint
CENTERLESS GROUND
TO $\pm .0001$ " ACCURACY
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including
PLASTICS



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Several models available for engraving steel stamps, medallion dies, ring dies, branding dies, name plates, small tools and machine parts. For immediate attention write directly to manufacturer below. Ask for nearest representative.

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The Most significant advance
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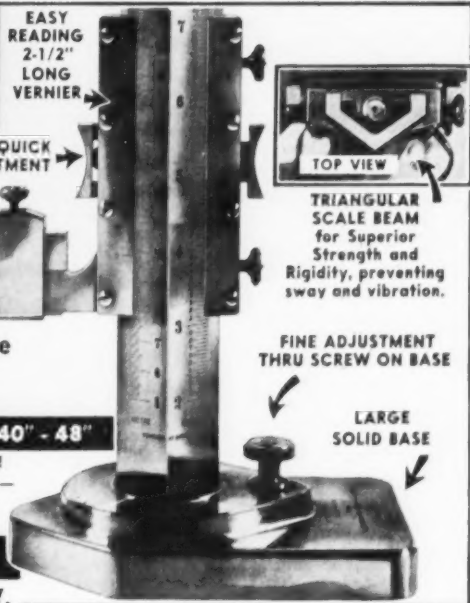
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For more data circle 514 on Reader Service Card



new shop equipment . . .

ing parts except the valve, and the top and bottom of the plate are machined parallel to within 0.001 inch per foot. The unit is available in two models; namely, the Model A and the Model B. The Model A contains the valve integral with the plate and a $\frac{1}{8}$ -inch N.P.

T. hole for the inlet air connection. The Model B includes a separate block valve, $\frac{1}{8}$ -inch N.P.T. holes for air connections in the valve and a $\frac{1}{4}$ -inch N.P.T. hole for the air connection in the plate.


For more data circle 105 on Reader Service Card

★ ★ ★

TILTING ROTARY INDEX MILLING TABLE

Chicago Tool and Engineering Co., 8399 S. Chicago Ave., Chicago 17, Ill., has announced the "Palmgren" No. 84 Tilting Rotary Index Milling Table which incorporates rotary feed and two cross slides, in addition to a tilting feature which enables an operator to set the table at any angle from 0 to 90 degrees in a vertical plane. The table has an 8-inch diameter top which is graduated 360 degrees. The center of the top plate is bored for a $1\frac{1}{2}$ -inch locating plug. By tightening two locking screws, the top is locked in position. Two $\frac{5}{8}$ x $1\frac{1}{8}$ -inch T-slots cross at the center.

The rotary indexing dial is calibrated in 3-minute intervals, and the cross feed dials are accurately graduated in thousandths. Cross slides travel $4\frac{1}{4}$ inches at right angles, and the cross feed screws are $\frac{1}{2}$ -inch Acme thread. Handwheels on the table are removable, and an indexing attachment and



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DRILL SHARPENER**
for Drills 41 - 60 and
61 - 80 R.H. & L.H.
A properly sharpened drill cuts
faster — more accurately and is
less likely to break.
Write for circular and
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P. O. Box 99, Station A, Worcester 8, Mass.

For more data circle 515 on Reader Service Card

**Monarch Precision
SHAPLANE
Radius Tools**
Patent Pending



**Five Models for
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RANGE $\frac{1}{2}$ " TO 3" RADIUS (MODELS ALSO
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Phone Drexel 3-3571

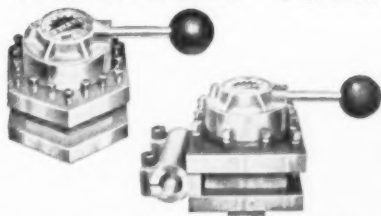
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HAND KNOBS
6 SIZES CAST-IRON
Tapped, Reamed
or Blank
Hex-shaped hub for
extra tightening
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CORPORATION**
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"WEDGE-LOCK" TURRET



Does not raise up when indexing in all 12 positions. 4-way and 6-way block models. Repetitive accuracy to within .0003 plus or minus within itself.

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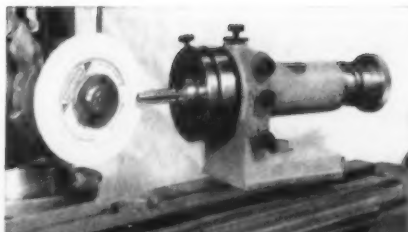
Makers of Combination Rotary Tables and Angle Plates. Also Helical Gear Speed Reducers, Single and Double Reduction. Also Special Gears of All Types.

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Atlantic RADIAL RELIEVER

A low-cost means of grinding uniform radial relief on taps, countersinks, step drills, gun drills, reamers, etc.

Quick setting for: 2 to 6 flutes, right or left hand operation, amount of relief. Write for folder.

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For more data circle 519 on Reader Service Card

How SQUARE HOLED SLEEVES SPEED UP TOOL-MAKING!

One of the most difficult problems in tool making can be solved easily and quickly with Sturdy Square Holed Sleeves. The perfection of broached square holes can be had in boring bars, milling cutters and many other applications at a small fraction of the cost of imperfect hand-made square holes. The Sturdy Square Holed Sleeve consists of a round sleeve with a perfectly square hole broached through the center. This hole is tapped at one end to receive a back-up screw which is furnished with the Sleeve. The Sleeve can be sweated or pressed into a drilled and reamed hole to make a perfectly square accurate hole in a very few minutes.

The Sturdy Square Holed Sleeve will save you many hours and many dollars in the making of boring bars, tool holders and other tools requiring square holes.



Patents Pending



SLEEVES MADE IN FOLLOWING SIZES:

3-16, 1-4, 5-16, 3-8, 7-16, 1-2, 5-8, 3-4, 1"

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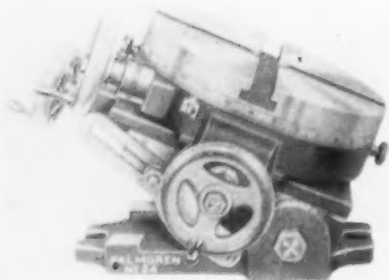
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• DETROIT 19, MICH.

*Write for
Literature*

For more data circle 520 on Reader Service Card

new shop equipment . . .



"Palmgren" No. 84 Tilting Rotary Index Table

plates can be quickly added to the rotary feed shaft. The worm gear ratio is 40 to 1. The base measures $9\frac{3}{4}$ x 5 inches with $\frac{5}{8}$ -inch keyways and keys for machine mounting. The No. 84 is accurately graduated and ready for in-

stant use at any angle from 0 to 90 degrees by locking the adjustable support screws.

For more data circle 106 on Reader Service Card

★ ★ ★

IMPROVED POWER HACK SAW HAS 4 x 4-INCH CAPACITY

Sales Service Machine Tool Co., 2355 University Ave., St. Paul 14, Minn., has announced the improved Jefferson 601 Power Hack Saw which has a 4 x 4-inch capacity and which is capable of handling pipes or rounds up to 4 inches o.d., either on a straight or 45-degree angle cut. According to the manufacturer, the saw is ideal for industrial use where a larger capacity sawing machine is not required. Either 10 or 12-inch blades may be used. The machine is equipped with an automatic stop electric switch, Oilite bearings, adjustable bronze gibs in the saw frame,

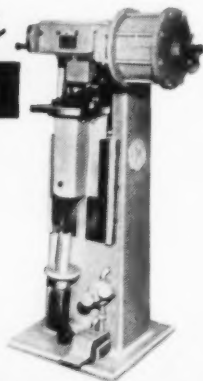
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VERSATILE

Precision
MARKING



All pneumatic . . . 4 tons of table lift brings part into marking position. Air cushion gently holds it while smooth marking die carriage rolls perfect marks. Up to 800 pieces per hour on parts up to 6". Marks round or flat pieces.



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For more data circle 522 on Reader Service Card

Are YOU Wasting Time? Gambling With Your Hand Tapping Job? Are Your Tapped Holes to Size and Square?

This Fixture will save you 60 per cent of your present free hand tapping time. The articulate arms swing clear of the large table permitting placing work. An infinite number and sizes of holes can be tapped without moving the work piece. Vise will hold work as small as $\frac{3}{8}$ " square. The tap floats and locates itself in the hole. Taps are held in individual spindles, requiring but a few seconds to change. Write for pamphlet.



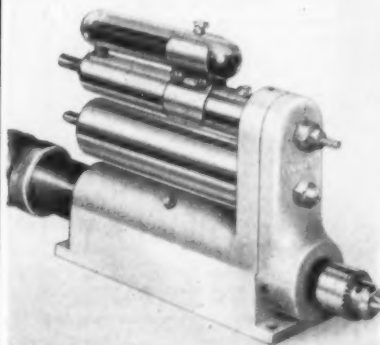
TOOLS, Inc.

1734 No. 25th Ave. • Melrose Park, Ill.

For more data circle 523 on Reader Service Card
January, 1956

NEW LYNMATIC 101 DRILL HEAD

with Transparent
Hydra-Control Reservoir



A precision drilling unit, engineered for extreme versatility and rugged simplicity with only four moving parts. The air feed drilling head has many features including an adjustable hydraulic feed control that permits accurate constant feeds anywhere between stop and 200 feet per minute with rapid traverse to the work.

Featuring a newly-designed transparent hydra-control reservoir which establishes an open system that eliminates the captured air problem and also permits visual check on hydraulic fluid.

Although it can be used with any three or four way valves, the Lynmatic 101, when used in conjunction with the Lynco automatic Control Box CB-1 and Lynco Cycle Timer will perform varied operations to automatically drill holes properly up to $\frac{1}{4}$ -inch diameter in almost any material.

Sides and bottom are machined square and parallel to the spindle to close tolerances to simplify alignment. A base width of 2 inches permits drilling to 2-inch centers with a 2-inch stroke.

LYNCO INC.

National Distributors

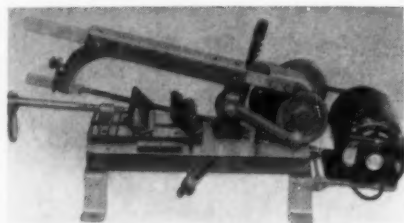
BURKLYN COMPANY

3429 Glendale Blvd., • Los Angeles 39

For more data circle 524 on Reader Service Card
modern machine shop 293



new shop equipment . . .



Improved Jefferson 601 Power Hack Saw

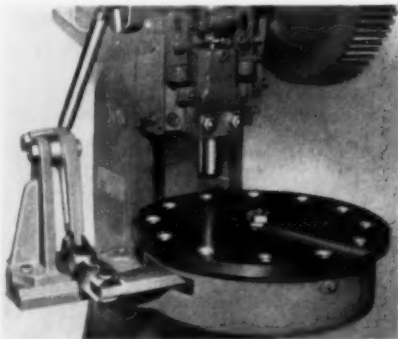
gage bar and latch bar for holding the saw frame when not in use. The improved Jefferson 601 Saw is supplied with or without a $\frac{1}{4}$ -h.p., single phase, 110-volt motor and switch.

For more data circle 107 on Reader Service Card

★ ★ ★

DIAL INDEX FEED AUTOMATES MACHINE OPERATION

Benchmaster Mfg. Co., 1835 W. Rosecrans Ave., Gardena, Calif., has announced an automatic dial index feed which may be used on Benchmaster or other types of punch presses, as



Benchmaster Automatic Dial Feed Table installed on Benchmaster punch press



Specifications
Table Movement:
6" x 10"
Table Size:
7" x 17½"

Handle your small part precision JIG BORING on the LINLEY JIG BORER

Why tie up your big, costly jig borers on small work when you can get maximum utility at less cost per hour on a machine exactly fitted to your work. Put your small work on the LINLEY where it belongs and reserve your large machines for large work, where large work belongs. You'll save money this way.

Complete details sent promptly on request

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BRIDGEPORT 1, CONN.

For more data circle 525 on Reader Service Card

294 modern machine shop

January, 1956

new shop equipment . . .

smoke because it utilizes the excellent

well as on drill presses. This accessory is said to convert a standard machine to almost full automation, avoiding the need for special one-purpose tools, and operates at rates up to 6,000 strokes per hour. No installation problems exist—four bolts secure the complete unit to the machine. The rotating table is actuated with each stroke of the punch press ram or quill travel of a drill press. Stations are loaded with workpieces and automatically positioned under the punch or drill for the machining operation. The table can be hand loaded or hopper fed, depending upon the nature of the work and requirements. Typical punch press operations which can be performed include automatic marking, assembling, reaming, trimming, crimping and others.

The automatic index feed is available in two models, featuring a 12 or 15-inch

table diameter with a choice of 10 or 12 stations. Up to 24 stations can be supplied, as well as larger tables, on special order. The unit measures 3½ inches high x 13 inches deep x 21 inches wide, overall.

For more data circle 108 on Reader Service Card

★ ★ ★

EMULSIVE COOLANT HAS EXTREME PRESSURE PROPERTIES

Identified as Soluble Oil HD, a heavy-duty emulsive coolant formulated with extreme pressure properties has been announced by The Texas Co., 135 E. 42nd St., New York 17, N. Y. According to the manufacturer, a rich emulsion of the soluble oil has the heavy-duty characteristics desired to carry off the heat of the work effectively while operating under severe work conditions. The product is easy to

ENGINEERED

Live Centers

Standard shanks with Morse tapers carried in stock . . . send us your specifications and blueprints . . . we will see that your job is set up with the right LIVE CENTER.

STURDIMATIC TOOL COMPANY

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January, 1956

modern machine shop 295

liver a constant high torque output at any speed from 0 to 80 r.p.m. Accord-

new shop equipment . . .

handle and prepare for production runs. It mixes readily with temperate water; can be used with either hard or soft water; provides a highly stable emulsion; and has excellent rust-inhibiting properties. The coolant can be used with carbide and high-speed steel tools in automatic operations. It is claimed to be capable of eliminating

smoke because it utilizes the excellent heat transfer properties of water while functioning efficiently under extreme pressure.

For more data circle 109 on Reader Service Card

★ ★ ★

FORM RELIEVING FIXTURE HAS POWER OPERATION

Royal Oak Tool & Machine Co., 29800 Stephenson Highway, Royal Oak, Mich., has announced that its universal form relieving fixture has been developed in a motorized model for tool grinding departments where a quantity of tools of one design are ground at a time.

Power operation of the relief fixture not only eliminates the tedium of hand grinding, but the compact drive has been engineered to de-



Buy C/R Jawhead hammers, mallets, mauls from your local industrial supplier, or write for illustrated folder.



be HARD-HEADED about "Soft" hammers!

You get more years of proved-in-use performance with C/R Jawheads than with any other soft hammer on the market. C/R Jawheads do more work with fewer blows . . . reduce worker fatigue, improve safety. They last longer and cost considerably less than most comparable "soft" striking tools. C/R Jawheads are the best soft hammers you can buy. Try 'em!

See these features — proved in use!

- Tough rawhide faces won't crack, spark, mar fine surfaces
- Threaded collar locks faces tight. They can't loosen, fly out
- Extra-long handles give greater striking power
- Oversize handle flare gives safe, comfortable grip

CHICAGO RAWHIDE MFG. CO.

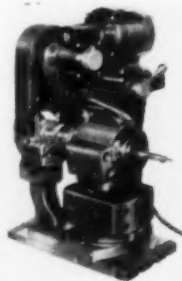
1301 Elston Ave. Chicago 22, Illinois

IN CANADA:

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For more data circle 527 on Reader Service Card



R-O Universal Form Relieving Fixture with power operation

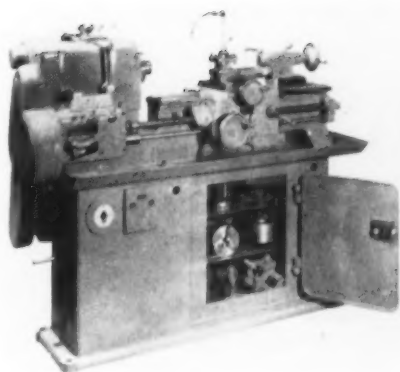
liver a constant high torque output at any speed from 0 to 80 r.p.m. According to the manufacturer, the power operated fixture produces grinds equal to or better in quality than hand grinding. A 1/15-h.p., 1,725-r.p.m. reducer motor is used with a 40 to 1 gear ratio to power the universal form relieving fixture.

For more data circle 110 on Reader Service Card

★ ★ ★

11-INCH SWING LATHE HAS 18-INCH SWING IN GAP

Stanley Sheppard, 30 Church St., New York 7, N. Y., is now marketing the Harrison 11-Inch Swing Lathe which features an 18-inch diameter swing in the gap and a 4½-inch width in front of the faceplate. Incorporating ruggedness and high precision, the machine is said to be equally adaptable for both toolroom and production work.



Harrison 11-Inch Swing Geared-Head Lathe

The distance between centers is 24 or 40 inches. The headstock is of the all-g geared type, providing eight spindle speeds ranging from 42 to 960 r.p.m. An alternate speed range is available

1 Grinder Sharpens ALL Drills



- 90° TO 140° INCLUDED ANGLE
- 1/8" TO 2½" DIAMETER
- 2-3-4 FLUTE DRILLS
- WITHOUT CHUCKS OR COLLETS

STERLING Model "DV" Variable Angle DRILL GRINDER

SET-UPS ARE EASY—the wheel head tilts to change the included angle... no chucks or collets to change for different size drills. Drill locates on lip being ground for maximum accuracy. Built-in clearance gauge provides positive clearance angle. ONE grinder gives you more capacity at lowest cost. Ask your dealer or write for Bulletin "DV".

McDonough Mfg. Co.

1521 GALLOWAY
EAU CLAIRE, WIS.

For more data circle 528 on Reader Service Card

new shop equipment . . .

with a two-speed motor, allowing 16 spindle speeds from 31 to 1,440 r.p.m. The spindle is of tough carbon steel, splined and bored to pass a 1¼-inch bar, and is mounted on opposed Timken preloaded bearings at the front and a single row bearing at the rear end.

C A M S

Fully equipped modern machine shop with extensive Jig Boring, Surface Grinding, Horizontal Boring and Thread Grinding facilities as well as modern Cam Milling and Cam Grinding equipment.

Your Inquiries Answered Promptly

HIMOFF MACHINE CO., INC.

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For more data circle 529 on Reader Service Card

Adjustable Automatic Stock

FEED STOP for DIES

Dahlstrom AUTOSTOP

No drill jig . . .
no slotting . . .
no milling.
Specify whether
for use on blank-
ing, progressive
or compound dies.
Mounts on
stripper plate
in 15 minutes.
\$1.75 each;
\$18 doz.

Write for pamphlet.

BRANCH
MFG. CO.

15 Olson Drive • North Branch, Minnesota

For more data circle 530 on Reader Service Card



\$175

Adjustment of bearing loading is provided. The main gears mounted on the spindle are made from a special forging, broached for close fit and yet easy sliding for gear change.

The bed of the machine is of half-box form with uniform thickness throughout, well ribbed and cross-braced to prevent deflection or twist under the heaviest cutting load within the capacity of the lathe. Standard accessories include steadyrest, follow rest, drive plate, 9-inch diameter faceplate, two-cone center wrenches, grease gun and installation and spare parts manual. Various attachments for the Harrison lathe include electric coolant pump, tank and fittings; milling attachment which can be adjusted to any angle and set by means of the graduated swivel slide; toolpost grinder for internal and external grinding; and a boring table which fits directly onto the saddle.

For more data circle 111 on Reader Service Card

★ ★ ★

36-SPINDLE HEAD PERFORMS THREE OPERATIONS ON TWO PARTS

Thriftmaster Products Corp., 1034A N. Plum St., Lancaster, Pa., has announced a special 36-spindle drill head which is designed to perform three operations on two dissimilar parts. A complete unit including drill bushing plate, index table and fixtures, the drill

BREMIL

The IMPROVED Compound Lever Shears

ALL ALLOY
FULLY
GUARANTEED

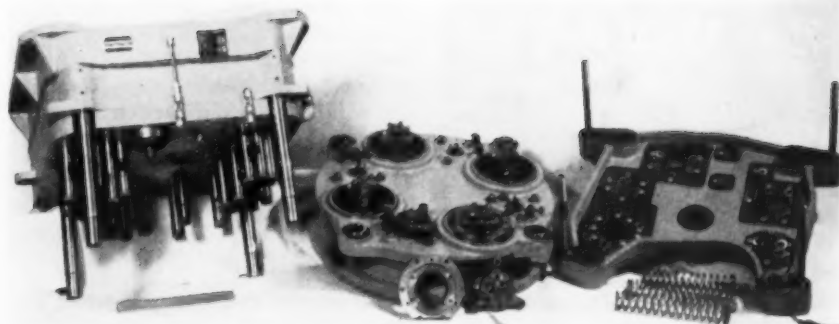
Two Sizes

PORTABLE

No. 1 cuts up to No. 11 gauge strip or sheet.
No. 2 cuts up to ¼" steel plate.

BREMIL MFG. CO.
1020 Holland St., Erie, Pa.

For more data circle 531 on Reader Service Card



Thriftmaster 36-Spindle Drill Head for performing three operations on two dissimilar parts

head is used for drilling, reaming and counterboring the two parts at the same time. The four-station ball-bearing index table is manually operated with three stations used for machining and the fourth for loading and unloading. The approximate location of the index

plate is obtained by a spring-loaded plunger; the exact location is obtained by four hardened rods which register with hardened bushings in the fixture. All 36 spindles have vertical and depth adjustment, and each spindle is operated at the desired speed. The special

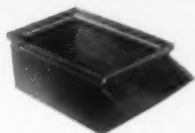
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● Our "TOP RIM" construction provides stronger support all around the box—no corner inserts to come loose and fall out. We invite comparison in design, construction and price.

Efficiency in designing and manufacturing allows us to quote favorably on any type or size stacking box.

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AND PRICES.

Sterling Factory Equipment Co., 183 Charles St., Providence, R. I.



Sterling Bin Front "Top Rim" Steel Stacking Box. Size 10" x 12" x 6".

Sterling "Top Rim" Steel Stacking Box with drop handles. Size 18"x12"x6".





Sterling

Quality Handling & Storage Equipment



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New KNURLMASTER
Hand Knurler

\$13.50



No distortion —
even on 1/8" stock!
MODEL "C"

For small production runs on 1/8" to 1" stock. Exclusive screw design gives perfect knurl pattern. Furnished with 3 hardened knurls of standard 1/2" dia. Forged steel frame is self-centering. Write for illustrated folder.

Dealers Inquiries Invited

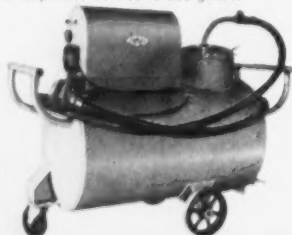
ROCKWIN MANUFACTURING CO.

45 Rose Street New York 38, N. Y.

For more data circle 533 on Reader Service Card

REMOVES AND FILTERS COOLANT FROM MACHINE SUMPS

The Model 20T Series NA is just one of five Carnes portable sump cleaners. Each is engineered for a specific cleaning job from cleaning a bank of machine tools in a short time to handling highly abrasive coolant. Capacities from 55 to 200 gallons.



Write for
literature
and
details to

**COOLANT EQUIPMENT
CORPORATION**

VERONA

WISCONSIN

For more data circle 534 on Reader Service Card

300 modern machine shop

new shop equipment . . .

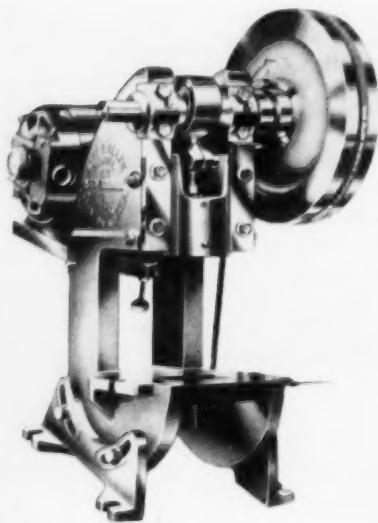
36-spindle drill head features standard full ball bearing construction and is oil lubricated by a circulating oil pump.

For more data circle 112 on Reader Service Card

★ ★ ★

O.B.I. BENCH-TYPE PUNCH PRESS HAS 2-TON CAPACITY

Designated as the Model BT-2, a 2-ton open back inclinable power bench-type punch press which is said to have a mass production capacity up to 250 operations per minute on continuous operation has been announced by Alva Allen Industries, Punch Press Department, Dept. MM, Clinton, Mo. Suited to small stampings, the press incorporates a quick-action, single pin clutch with simple, positive, non-repeat or repeat action; straight ram guides with flat gib, giving accurate fitting of dies



Allen Model BT-2 O.B.I. Punch Press

January, 1956

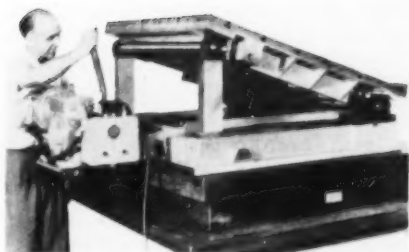
for precision stamping; accurate ram adjustment with simple, positive lock; and extra large die space for stamping, shearing, forming, drawing, riveting, blanking, cutting and similar operations. The frame of the press can be tilted easily to any operating angle desired. The press has a standard stroke of $\frac{3}{4}$ inch; however, $\frac{1}{4}$ to $1\frac{1}{2}$ -inch strokes can be supplied as extra. The machine features a V-belt drive and requires only a $1\frac{1}{3}$ -h.p. motor. Punches and dies can be made from cold rolled stock for short runs. The press weighs 116 pounds.

For more data circle 113 on Reader Service Card

★ ★ ★

SINE PLATE MEASURES 48 INCHES SQUARE

Omer E. Robbins Co., Dept. B-2,
24800 Plymouth Rd., Detroit 39, Mich.,



Robbins 48 x 48-Inch Sine Plate in use

has announced the addition of a 48 x 48-inch sine plate to its standard line of sine plates and Magna-Sines. This is believed to be the largest sine plate with powered adjustment. According to the manufacturer, the "jumbo" size unit with 2,304 square inches of working area incorporates many features. Mechanical raising and lowering of the heavy top plate is electrically controlled.

Commander TAPPER

- Wider Range . . . 1 Tapper Handles No. 0 to $\frac{3}{4}$ " Taps
- Automatic Tap Protection
- Furnished to fit any Drill Press

Commander — "The Tapper That Thinks For Its Operator," has the adjustable full range torque control that instantly stops any tap when it becomes dull, loaded, strikes a hard spot or bottoms in blind hole tapping. Assures maximum tap protection, higher production, even with inexperienced operators.

Your nearby Commander Distributor can give you a demonstration in your own plant. Write for his name and a copy of the NEW Commander Full Line Catalog.

COMMANDER MFG. CO.

4224 W. Kinzie St.

Chicago 24, Ill.



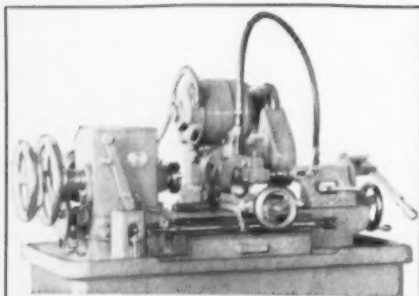
Any operator
does precision
tapping with
a *Commander*
TAPPER

Product of *Commander* . . . Builder of the *Multi-Drill*

For more data circle 535 on Reader Service Card

new shop equipment . . .

ed. Ample power is supplied by a 1-h.p. motor for quick, silent adjustment. A hand control wheel permits fine adjustments of the top plate on the gage blocks or standards. Also, gage blocks are positioned at both open corners to eliminate dimensional inaccuracies.



IMPROVED WALTHAM THREAD MILLER

"Send for new sheet illustrating the machine with complete pedestal and describing the improvements."

WALTHAM MACHINE WORKS, INC.

BOX 48 • WALTHAM, MASS.

For more data circle 536 on Reader Service Card

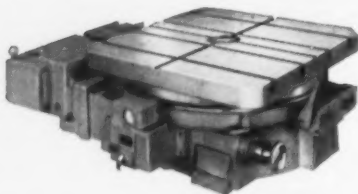
The sine plate utilizes a feature which consists of specially-designed swivel blocks, designed to assure evenly distributed weight over a great surface area, increasing the life of the sine plate and life of the blocks. The sturdily constructed, single angle, non-magnetic tool has tapped holes and T-slots in the top plate for clamping the workpiece. The base plate and top plate are meehanite castings. Rolls, hinge blocks, swivel blocks and gage plates are made of alloy steel, heat treated and ground. Eye bolts are provided for safe, convenient placement. The top plate and base plate are scraped parallel to 0.0008 inch. Maximum angle setting is 60 degrees, and distance between roll centers is 40 inches. The complete unit weighs 4,000 pounds. For positive rigidity on extra-heavy duty machining operations, hardened and ground carburized steel clamping bars are available.

For more data circle 114 on Reader Service Card

★ ★ ★

DOUBLE CUTTING MACHINE HANDLES LENGTHS FROM 22 TO 102 INCHES

Cutting lengths ranging from a 22-inch minimum to a 102-inch maximum (special lengths on request) can be handled by a double cutting machine, designated as the Model DM-352, introduced by Stone Machinery Co.,

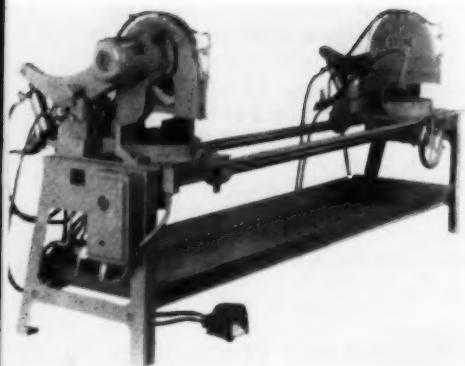


FASTER set-ups and positioning

You save set-up and positioning time with Gilbert rotary tables. *Hand-indexing:* 36" and 50" square or round. *Power rotary and power feed:* 36", 50", 60", and 72" square or round. Special tables built to your requirements. For complete descriptions and specifications, write for Bulletin 854.

THE CINCINNATI **GILBERT** MACHINE TOOL COMPANY • CINCINNATI 23, OHIO

For more data circle 537 on Reader Service Card



Stone Model DM-352 Double Cutting Machine

Inc., Manlius, N. Y. Designed for cutting all non-ferrous metals with saw blades and ferrous metals with abrasive cut-off wheels, the machine has two semi-independent heads which cut simultaneously. Either head may be posi-

tioned to make 90-degree cuts, or will cut at any degree up to and including 45 degrees in either direction. Power stroking of the cutting heads is air-actuated by a foot pedal valve with automatic return. Oil mist sprays lubricate the blades through each cut. When cuts are completed, the saw blades retract automatically into guards and the operator removes the cut section.

The machine is powered by two $3\frac{1}{2}$ -h.p., induction-type, geared-in-head motors with a 3,450-r.p.m., geared to 3,200-r.p.m., spindle speed. Either 12 or 14-inch blades may be used with the machine. With the 14-inch blades, cuts can be made from $1 \times 6\frac{1}{8}$ inches up to $3 \times 7\frac{1}{8}$ inches at 90 degrees, and $1 \times 4\text{-}5/16$ inches up to $3 \times 4\frac{1}{8}$ inches at 45 degrees. Larger cutting capacities are possible by ordering special straightedges set behind the two swivel points. Standard equipment with the Model DM-352 Double Cutting

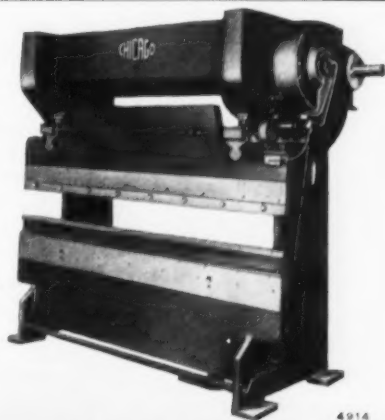


STEEL PRESS BRAKES

43 Standard Sizes

Readily adapted for a wide variety of bending, forming drawing, notching, blanking, punching, embossing, etc.

DIES Complete Line of Induction Hardened Dies for All Makes and Sizes of PRESS BRAKES.



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MANUFACTURING COMPANY

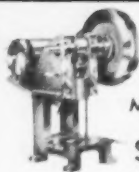
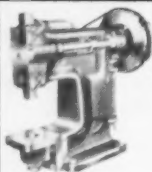
7418 S. Loomis Boulevard, Chicago 36, Illinois

CHICAGO

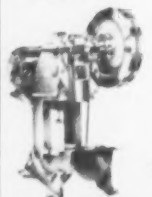
STEEL BENDING BRAKES
BOX and PAN BRAKES
PRESS BRAKES

For more data circle 538 on Reader Service Card

Heavy Duty Bench Type ALLEN PUNCH PRESSES



Model B-2
2 Ton
\$97.50
less motor



Powerful, Dependable
and Economical bench
type punch presses.

Many Popular Models
1/2 to 5 ton capacities
Moderate in price.

See Your Supply Dealer
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Write for FREE Catalog
showing all models with
descriptions and prices.

ALVA ALLEN INDUSTRIES
Dept. MM Clinton, Mo.

For more data circle 539 on Reader Service Card

new shop equipment . . .

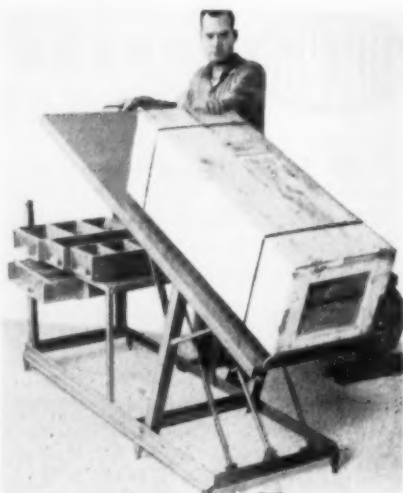
Machine includes an air pressure regulator gage, oiler and filter, two automatic oil mist sprays, holding clamps at both kerfs with separate air pressure regulator and gage. The machine requires a floor space of 26 x 120 inches.

For more data circle 115 on Reader Service Card

★ ★ ★

HYDRAULICALLY CONTROLLED PACKING BENCH TILTS HEAVY BOXES TO FLOOR

Designated as the "Hydra-Tilt," a hydraulically controlled packing bench, which can be tilted to set boxes weighing up to 1,000 pounds on the floor after they have been packed, has been announced by Valley Craft Products, Inc., 770 Jefferson Ave., Lake City, Minn. The packing bench is said to



Valley Craft "Hydra-Tilt" Packing Bench
being tilted to unload heavy box

For
SAFETY
in marking
all kinds of
Metal

Use

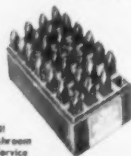
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BEVL"**

**LETTERS and
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The most economical all purpose grade of Safety Letters and Figures. Will give outstanding service on almost any marking job. All sizes — 1/4" to 1" characters from stock Mecco Safety Steel for No Spelling and No Mushrooming.



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Mecco
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M.E. CUNNINGHAM CO.

1051 Chateau Street • Pittsburgh 33, Pa.

For more data circle 540 on Reader Service Card

304 modern machine shop

January, 1956

have a hydraulic cylinder incorporated in its design that allows the operator to automatically tip the load from table to floor by a control lever. Heavy pieces of equipment can be placed on the table by means of a mono-rail and hoist, and can then be boxed at convenient working height and tilted to the floor so that they can be trucked away. Large quantities of small objects, which must be shipped in large containers,

can also be efficiently boxed on the table and then easily moved to the floor.

According to the manufacturer, a great deal of time can be saved with the packing table as a single operator can quickly move loads up to 1,000 pounds to the floor rather than requiring assistance to perform this operation. Safety is another important feature of the table as it eliminates the possibility of injury when moving

★ ★ ★ ★ ★

SOMMA STANDARD circular form tools make MORE PROFIT

Now you can save time and money on a wide variety of form tool operations by replacing costly made-to-order or hand ground tools with Somma Standard Circular Form Tools.

In addition you are assured of uniform accurate dimensions every time, easier set-ups, and a better finish on the parts.

Check list for name of representative near you.

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And Somma Standard Tools are available through the Somma representative in your area. • Write for new catalog and price list of standard tools and blanks.

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W. H. Brooke Machine Co.,
Chicago

J. W. Mull Co., Cincinnati,
Cleveland, Indianapolis,
St. Louis, Toledo

Screw Mach. Tool & Sply.,
Milwaukee

Form Products Co., Inc.,
Minneapolis

Mahar Tool Supply Co.,
Saginaw, Mich.

SOUTHWEST

James A. Damschroder,
Garland, Tex.

John Di Eugenio, Phoenix
Complete Indus. Sply., Tucson

WEST

Sonnet Supply Co., Hawthorne, Cal.
(West Coast Warehouse)

Bay Cities Tool & Sply., Berkeley
Prentice Cleaves, San Diego

Brennan-Hamilton Co., San Francisco
R. J. Storm & Co., San Francisco

Industrial Tool & Sply. Co., San Jose
M. R. Preist & Sons, Boise

J. E. Hazeltine, Portland, Seattle,
Spokane
Cragin & Co., Seattle

Somma TOOL CO., INC. 20 BROWN STREET, WATERBURY, CONN.

West Coast Warehouse: 576 N. Prairie, Hawthorne, Cal.

For more data circle 541 on Reader Service Card

new shop equipment...

heavy boxes off the packing bench. A 3-inch height adjustment of the table can be made to suit the operator's convenience. Several drawers are built in to provide storage space for tools and packing materials. The table measures 24 x 72 inches. The cylinder which operates the table requires no source of

power other than the load being handled, as a closed hydraulic system controls the tilt of the table.

For more data circle 116 on Reader Service Card

★ ★ ★

WORK-HOLDING DEVICE IS SELF-CENTERING

Identified as John's Drill Jig, a work-holding device which is automatically self-centering has been announced by Heuser Mfg. Co., 1638 N. Paulina St., Chicago 22, Ill. The device has two moving master jaws which work on a right and left-hand Acme thread, allowing them to come to the same distance from the center every time. The self-centering action, it is claimed, will hold within 0.0015 inch or better. The fixture will provide a common base with quick clamping means for a count-

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SECTIONAL STACKBINS® give you the greatest flexibility and ease of installation ever devised for parts, tools, materials storage containers. You can set them up in minutes without tools! By combining bin sizes and number and size of openings, you get a storage system tailored to fit your particular needs. **SECTIONAL STACKBINS** give you maximum storage utility in minimum space. Available in 6 interstacking sizes.

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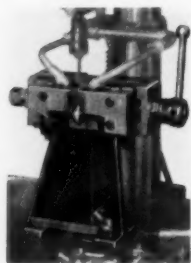


SYSTEM

Still Accessible"

For more data circle 542 on Reader Service Card

306 modern machine shop



John's Drill Jig

January, 1956

less combination of drill jigs on such operations as drilling, tapping, reaming, centering, milling, boring, grinding and assembling. It is said to provide precise, split-second centering; rigid clamping of work; fast chucking; visibility; adequate chip room; and economy on short or long runs.

According to the manufacturer, John's Drill Jig is ideal for precision cross or end drilling of round, hexagon or square stock, or standard or odd shaped smooth or rough castings from $\frac{1}{8}$ to 8 inches o.d. It can also be used as a milling vise where the self-centering feature would be an advantage. Standard removable slip fit bushings and holders are available to drill center or mean-off-center holes from No. 60 to 1-1/32-inch drill. Special bushing holders for multi-drill operations can be easily tooled. The fixture is available in 6, 8 and 14-inch sizes with 2, 4 $\frac{1}{4}$ and 7 $\frac{1}{2}$ -inch jaw openings, respec-

tively. Bases are available for mounting the jig from 1 to 18 inches off the working surface.

For more data circle 117 on Reader Service Card

★ ★ ★

MAGNETIC HOLDING FEATURED IN SPECIAL PIERCING PRESS

Used either singly or grouped as shown in the accompanying illustration, the Dayton Rogers special piercing press provides for precision piercing of holes from 0.015 inch up to 1 $\frac{3}{4}$ inch diameter in stock thicknesses of 0.005 inch up to 3/16 inch. The press is said to be ideally suited for punching holes in stamped blanks.

A suitable piercing jig plate is constructed for each type of workpiece to be processed. Each workpiece is positioned on the piercing jig plate against locating pins and together are placed

**Greater
Precision!
Increased
Production!**

KUTMORE ADJUSTABLE HOLLOW MILLS

Any combination of . . . turning . . . tapering . . . facing . . . chamfering . . . trepanning in one pass. Exclusive micrometer adjustment feature for rapid set-up. Cutting capacities from 1/32" to 2" diameter in standard stock.

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Our engineering department is at your disposal on your hollow mill problems.

CARL WIRTH & SON, INC.

1625 CLINTON AVE. NO.
ROCHESTER 5, N. Y.



For more data circle 543 on Reader Service Card

new shop equipment . . .



Dayton Rogers Special Piercing Presses

in the press. When the jig plate with the workpiece are properly positioned, the jig plate automatically closes an electric circuit which magnetizes a stripper plate. The magnetism thus

generated holds the jig plate and workpiece firmly while the press automatically goes through its work cycle.

The combination magnet and stripper plate sheds or strips the workpiece off the punch by means of controlled pressure pins. Upon completion of the work cycle the electric current is automatically cut off, thus releasing the jig plate and workpiece.

According to the manufacturer, Dayton Rogers Mfg. Co., Minneapolis 7, Minn., the piercing press has proved most economical for piercing holes in various stampings wherein a limited quantity of stamping is required.

For more data circle 118 on Reader Service Card



**SCRUBBING MACHINE CLEANS
POLISHED METAL SHEETS**

An industrial scrubbing machine which cleans polished metal sheets be-



**BAND-SAW
MACHINE
ACCESSORIES**

used as standard equipment by leading band-saw manufacturers...

- **CARTER RIGID
BAND-SAW WHEELS**
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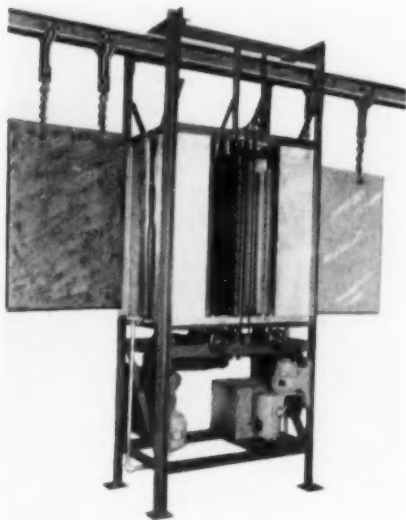


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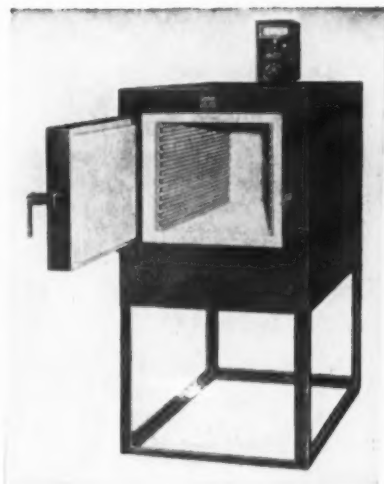
January, 1956

fore they are plated has been developed by Fuller Brush Company Machine Division, Hartford 2, Conn. Called the Cathode Plate Scrubber, the machine removes unwanted residue resulting from the buffing of cathode plates which are to be coated in the electrolytic deposition process. The machine is said to ensure that the buffed plates will have the clean surface essential for the proper adhesion of the metal deposit. The metal plates, suspended by hooks, are carried through the scrubber by an overhead monorail conveyor. A spray and cylindrical scrubbing brushes scour off residual material, and a clear water rinse leaves the plates clean as they leave the machine.

Powering the scrub brushes are two $\frac{3}{4}$ -h.p. drip-proof motors of the 1,800-r.p.m., 220-volt, three-phase, 60-cycle type. The motors turn the brushes by means of a chain drive. A $\frac{1}{4}$ -h.p. variable-speed motor for the feed roll drive moves the cathode plates through the machine at a speed of from 2-2/3 to 8



Fuller Cathode Plate Scrubbing Machine



More than two thousand satisfied users
WILL TESTIFY YOU

SAVE 3 WAYS WITH A LUCIFER FURNACE

1—Save on First Cost

CHECK THESE PRICES

Furnace Size	2000°	2300°
6x 6x12"	\$500.00	\$600.00
9x 9x18"	750.00	850.00
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Complete with 100% automatic electronic controls.

2—Save on Man Hours

Less operator attention needed—Lucifer controls are EXACT. They reach SPECIFIED heat rapidly and retain SPECIFIED temperature without variation. No special experience required when you use a Lucifer Furnace.

3—Save on Maintenance

Finest refractory materials are built into Lucifer Furnaces for better, more efficient heat retention. Elements are guaranteed, long lived, trouble free.

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310 modern machine shop

new shop equipment . . .

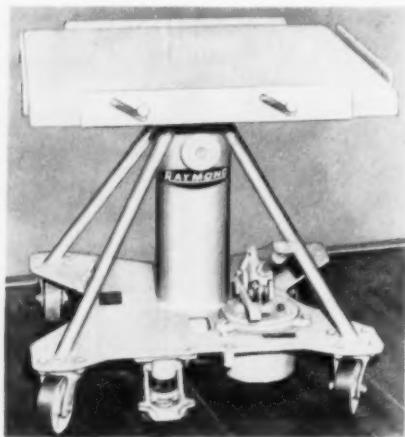
f.p.m. The spiral coiled scrub brushes
 are 47 inches long and have stainless
 steel backing. The fill consists of 0.007-
 inch crimped black nylon.

For more data circle 119 on Reader Service Card

★ ★ ★

**RETAINING BARS FOR RAYMOND
 HYDRAULIC ELEVATING TABLES**

The Raymond Corp., 88-136 Madison
 St., Greene, N. Y., has announced new
 style retaining bars for its line of hy-
 draulic elevating tables. The bars are
 made with two hook-shaped slots which
 permit them to be instantly set in two
 fixed positions. When raised to prevent
 dies or other objects from sliding off
 the table top, the bars form a 1-inch
 high fence on four sides of the table.
 In the lowered position the tops of the
 bars are flush with the top surface of
 the table. The new retaining bars are
 always ready for use. There are no
 bolts to loosen or tighten. They are in-



**Raymond Hydraulic Elevating Table equipped
 with flush-mounted retaining bars**

January, 1956

stalled on the sides of the table top by shoulder bolts which are fixed to the table by nuts and washers. A safety feature of the flush mounted bars is the absence of pinch points.

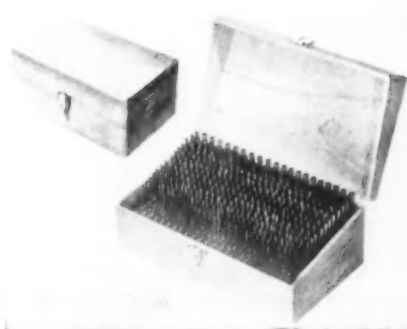
Tables now in use can be equipped with the new bars simply by drilling two holes through each edge of the table top. On new tables, the retaining bars will be installed at the factory.

For more data circle 120 on Reader Service Card

★ ★ ★

DRILL BLANK SET CONSISTS OF 485 PIECES

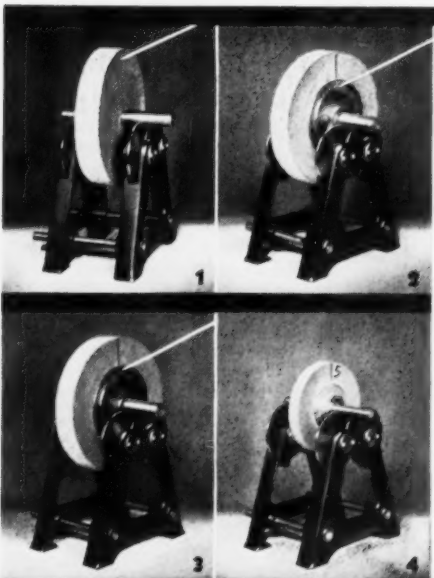
Designated as the 1/1000-Inch Set, a drill blank set consisting of a series of drill blanks each 0.001 inch larger than the preceding blank, starting with 0.015 inch and ending with 0.500 inch, has been announced by Hayden Twist Drill Co., 8626 Lyndon, Detroit 38, Mich. Each blank is made of hard-



Hayden 1/1000-Inch Drill Blank Set

ened and ground high speed steel, ground to a tolerance of plus 0.0002 inch and minus 0.000 inch. The set comprises 485 pieces.

Besides their obvious use as gages, the drill blanks can be used as test bars, sine plate members, radius gages, jig locating pins, index pins and standards



QUICK, EASY WAY TO BRING GRINDING, BUFFING, AND POLISHING WHEELS INTO BALANCE . . .

(1) Balance on Anderson super-sensitive Balancing Way and mark light side. (2) Line up mark with both zeros on Anderson Speedi-Balancer. (3) Turn both discs till wheel balances. (4) Record setting. Wheel is now prebalanced for instant use when needed: just use Speedi Balancer, set to number marked, as outside collar. Save time. Eliminate weights. Reduce vibration. Increase motor bearing life. Improve motor performance. For information on sizes, types, and prices of Anderson Balancing Ways and Speedi-Balancers, write for Bulletin 1-22.

ANDERSON BROS. MFG. CO.
ROCKFORD, ILLINOIS

For more data circle 548 on Reader Service Card

new shop equipment . . .

to be used when gaging round parts under dial gages and optical gages. They can also be used to make end mills, half round drills, flat drills, reamers, broaches, tool bits, mandrels for coiling springs and filaments, centers, pivots and dowels. According to the manufacturer, the drill blanks are invaluable for grinding into scribes, chisels, punches, prys, rollers, screw extractors and many other uses.

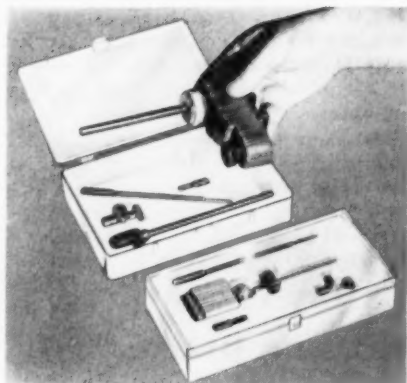
For more data circle 121 on Reader Service Card

★ ★ ★

MAGNETIC BASE TOOLS PACKED IN CLEAR-VIEW PLASTIC CASES

Enco Mfg. Co., 4520-26 W. Fullerton Ave., Chicago 39, Ill., has announced that its "Tiny-Titan" line of magnetic base dial indicator holders and lights

★ ★ ★ ★ ★



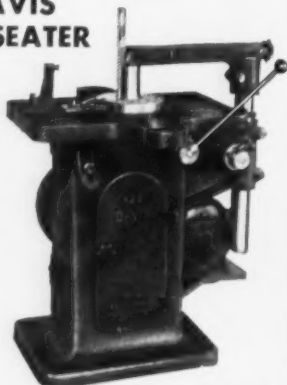
Enco "Tiny-Titan" Units packed in the new clear-view, non-breakable plastic cases

are now being packed in individual clear-view, non-breakable plastic cases, with units and accessories snugly imbedded in form-fit Styrofoam fillers. The Styrofoam filler is said to provide

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will
do the
job so
much
quicker
and
better?

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Circular



DAVIS KEYSEATER CO.

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ROCHESTER, N. Y.

For more data circle 549 on Reader Service Card

312 modern machine shop

HARGRAVE CLAMPS

The Most Complete Line
INDIVIDUALLY POWER-TESTED
FOR BETTER PERFORMANCE

No. 540

**STANDARD
CARRIAGE
CLAMP**



The No. 540 Hargrave "Standard" Clamps furnish unusual strength with exclusive construction — stronger than conventional malleable iron—yet priced competitively.

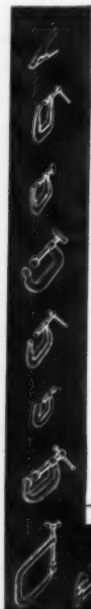
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Showing the most complete line of Clamps, Chisels, Punches, Drills for Hand, Air and Electric Hammers and Rotary Drills, Washer Cutters and File Cleaners.

THE CINCINNATI TOOL CO.

1947 Waverly Ave., Cincinnati 12, Ohio

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For more data circle 550 on Reader Service Card

January, 1956

absolute protection against shifting of pieces or vibration. According to the manufacturer, all "Tiny-Titan" models, with the exception of the No. 250 (duplex magnetic base lighting unit which holds up to a 100-watt bulb), are now packed in the new plastic cases. Two different sizes of cases are used. The smaller size measures $8 \times 1\frac{1}{2} \times 3\frac{3}{4}$ inches, and the larger size is $7\frac{1}{2} \times 1\frac{3}{4} \times 7\frac{1}{2}$ inches. The cases are equipped with plastic snap locks and plastic hinges with metal pins. The box corners are rounded.

According to the manufacturer, removing the units or individual accessories from the Styrofoam filler is quick and easy. Moreover, the filler may be removed as a whole, bearing the complete "Tiny-Titan" unit, and placed near the work for easy accessibility, if desired.

For more data circle 122 on Reader Service Card

★ ★ ★

TAPPING MACHINE IS DESIGNED FOR PRECISION WORK

Designated as the Model MT, a precision vertical-lever tapping machine which is designed for light tapping work on parts for instruments, optical equipment, watches and clocks, meters, and so on, has been announced by Sloan & Chace Mfg. Co., 344 Hickory St., Kearny, N. J. According to the manufacturer, the spindle and spindle bushings are of hardened steel, ground and lapped to a perfect fit. The table and base work surface are accurately squared with the spindle. The spindle carries two sheaves, with internal friction clutches, driven in opposite directions and mounted on a vertically sliding clutch sleeve. The spindle is driven in either direction according to the direction of pressure on the spring-lifted hand operating lever. The friction clutch is disengaged and the spindle stops immediately when the lever

MARVECO

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AGAIN CUT PRICES

	OLD PRICE	NEW PRICE
Model BX	\$ 70.00	\$ 60.00
Model C	\$ 82.00	\$ 70.00
Model CX	\$110.00	\$ 96.00
Model D	\$140.00	\$120.00
Model DX	\$160.00	\$136.00
Model E	\$170.00	\$146.00
Model EX	\$200.00	\$172.00



**Call Your Local
Distributor Or Wire**



MARVEL TOOL & MACHINE CO.

**1092 NORTH RIVER ROAD
ST. CLAIR, MICH.**

For more data circle 551 on Reader Service Card

new shop equipment . . .

reaches the adjustable stop screws in the lever bracket.

The totally-enclosed ball bearing motor, mounted on a sliding base, provides for adjustable belt tension. The "reverse" position of the switch provides for left-hand tapping operations.

"SEALFLEX" TUBING



**Leakproof—
Stays in place
For Coolants, Cutting
Oils, Solvents**

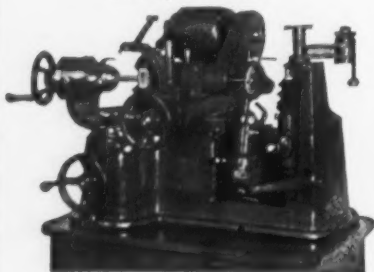
Made of steel with brass fittings — males, nozzles, stopcocks, etc., made in $\frac{1}{8}$ " $\frac{1}{4}$ ", $\frac{3}{8}$ ", $\frac{1}{2}$ ", $\frac{3}{4}$ " I.D. Write for bulletin and prices.

VERMONT FLEXIBLE TUBING CO.
Lyndonville, Vermont

For more data circle 552 on Reader Service Card

HYBCO TAP GRINDER

Sharpens Chamfers, Flutes
and Spiral Points



MODEL 1100

- Capacities No. 0 Machine Screw to $1\frac{1}{2}$ " Hand Taps.

HENRY P. BOGGIS & CO.
708 E. 163rd St., Cleveland 10, Ohio

For more data circle 553 on Reader Service Card

314 modern machine shop



Sloan & Chace Model MT Tapping Machine

The tapping machine has an overall length of 17 inches and an overall height of 14 inches. The base measures 14 x 6 inches.

For more data circle 123 on Reader Service Card

★ ★ ★

PRECISION CUT FILES FOR RECIPROCATING HAND MACHINE

Engis Equipment Co., 431 S. Dearborn St., Chicago 5, Ill., has announced a line of precision cut files of fine quality steel for the Di-Profiler reciprocating hand machine. The files are 4 inches in length—a size selected for maximum service with a reciprocating

**Now . . .
carried in
stock . .**



**AND 10050
Porting Tools**

A complete line of carbide tipped combination ream, counter-bore and facing tools to machine standards. Combines 5 operations in one tool! Thoroughly proven.

WETMORE TOOL & ENGINEERING CO.
5320 E. WASHINGTON BLVD., LOS ANGELES 22, CAL.

For more data circle 554 on Reader Service Card

January, 1956

tool. They are available in coarse cut and fine cut in each of six shapes; namely, equalling, oval, cant, round, square and lozenge. A riffler can also be supplied in the oval shape, either coarse or fine cut. The files, with the many accessories now available for the Di-Profilier, give even greater usefulness to the hand tool for finishing corners, small areas, grooves, fine contours and other difficult detail work.

For more data circle 124 on Reader Service Card

★ ★ ★

REDESIGN OF VACUUM PUMP REDUCES HEIGHT AND INCREASES VACUUM

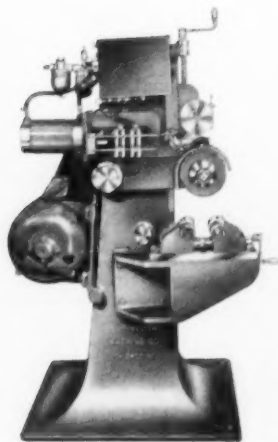
Leiman Bros., Inc., 149 Christie St., Newark 5, N. J., has announced a reduction of 33 per cent in overall height and an increase in vacuum to as low as 0.4 mm. mercury absolute in its line of straight wing rotary air pumps, which



Leiman Redesigned Rotary Air Pump

range in capacities from 2.4 to 40 cubic feet per minute. According to the manufacturer, these improvements were gained by a newly designed, more

**NOW! CUT UP TO 1,000 PIECES
OF PIPE PER HOUR . . .**



CONTINENTAL CUT-OFF MACHINES

Cut Pipes and Tubes faster with Continental High Speed Cut-Off Machines. Lowest maintenance means less cost to you. $\frac{3}{8}$ " to 12 $\frac{3}{4}$ " O.D. capacities, hand or automatic air-operated bench and floor models. Request free catalog.

Continental MACHINE CO.

SINCE 1919

1952 N. MAUD AVE. • CHICAGO 14, ILL.

For more data circle 555 on Reader Service Card

new shop equipment . . .

efficient automatic oiling system, placed under the pump instead of on top of the pump. This redesign and space-saving have been accomplished without any change in the length of steel wings, area of piston space or efficiency of the



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**LAY-OUT AND
IDENTIFICATION DYE**

7 COLORS

For Tool, Die, Pattern or Template layout on metal . . . Quick identification of bar stock, sheets, strips or parts . . . Shows up in sharp relief—dries instantly . . . Write for sample and circular on company letterhead.

**MICHIGAN CHROME &
CHEMICAL COMPANY**
8615 Grinnell Ave. • Detroit 13, Mich.

For more data circle 556 on Reader Service Card

automatic wing adjuster in the pump itself. When used for pressure, the pumps provide a range of from 15 to 20 pounds per square inch per gallon. For more data circle 125 on Reader Service Card

★ ★ ★

INDICATING FLOWMETERS FEATURE DIRECT FLOW THROUGH METER CHAMBER

Two indicating flowmeters, designated as the Models "L" and "LP," which feature direct flow through the meter chamber have been announced by the Instruments Division of Scully-Jones and Co., 1909 S. Rockwell St., Chicago 8, Illinois.

Direct flow design is said to keep the housing clean, and flexing of the vane in operation prevents any accumulation of scale or sludge. The flowmeters are in the total flow class so flow eddies due to pipe fittings have little or no effect on accuracy. The basic design improvement made in these instruments is the flexible vane riveted to the body at one end, leaving the other end free to traverse an arc equal in length to the calibrated scale. A horse-shoe section of the flexible vane permits the necessary motion under flow, safely within the elastic limits of the vane.

On the Model "L" flowmeter a pointer accurately indicates the position of the vane over a calibrated scale. This

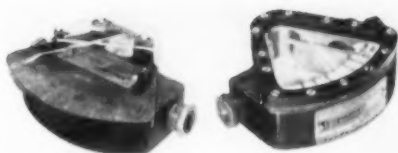
For Your Convenience . . .

the "Where to Get It" section of MODERN MACHINE SHOP provides a quick reference to machinery, tools and supplies advertised in the current issue. Use it consistently. You'll find it's very helpful. (See pages 336, 338, 340, 342 and 344.)

MODERN MACHINE SHOP
431 MAIN STREET • CINCINNATI 2, OHIO

pointer is coupled to the vane magnetically, thus eliminating packing glands, blind bearings and leakage possibilities. A plastic scale enclosure keeps the instrument clean and readable under almost any operating conditions. Because there is no communicating shaft between the meter flow chamber and the outside, high pressures, it is claimed, do not introduce friction due to vane shift or cause lag in the pointer. The scale is approximately uniform.

The Model "LP" is a companion instrument to the Model "L" and is designed with a transparent cover to permit viewing the liquid or gas flow. This feature is important where color changes occur in the fluid to indicate oxidation, contamination, waste pick-up or changes in concentration. Flow is measured by the same type of flexible vane used in the Model "L" except that attached to the vane is a highly polished pointer segment which travels



Scully-Jones Model "L" (left) and Model "LP" (right) Indicating Flowmeters

beneath the plastic cover and indicates the flow rate. The brightness of the pointer and its proximity to the cover make it easy to see in very dense colored fluids or gases. Because the flexible vane is suspended freely, responsive only to flow and with very small mass, it is apparent that the vane and the entire flowmeter are not position sensitive. This feature is of particular value when flow measurements must be made on machines or vehicles in motion. The small mass of the vane and the large surface presented to the flow-

★ ★ ★ ★ ★



THESE ENDS WITH ONE
STROKE OF PUNCH PRESS

ARCTWIN NOTCH

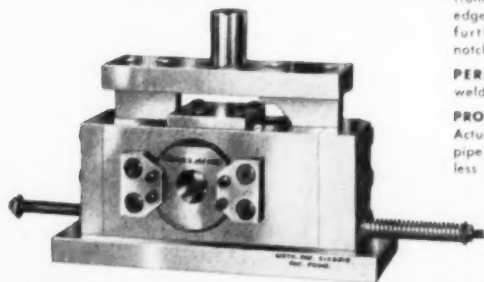
NO DEFORMATION Shears from inside out—cuts clean edges; eliminates need for further finishing; aligns notches automatically.

PERFECT "T" Joints for welding or brazing.

PRODUCTION NOTCHING Actual production time per pipe or tube end reduced to less than 3 seconds.

INTERCHANGEABLE

Punches and dies up to 2 1/4" O.D. pipe or tube for STANDARD TWIN NOTCH. (Special units available up to 3" O.D.)



PATENT PENDING

VOGEL TOOL AND DIE CORPORATION

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Fillmore 5-0160

For more data circle 558 on Reader Service Card



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WOODRUFF KEY SEAT CUTTERS



High speed steel. Arbor type. Correct dimensions for Woodruff Keys, with $\frac{1}{32}$ " oversize O.D. to permit re-sharpening. Regularly furnished without clearance on side teeth.

For quality, price and service investigate Keo combined drills and countersinks, T-slot cutters, center reamers and lathe mandrels. Big stocks for fast delivery.

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for illustrated literature
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80%

Machine
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Time



MIGHTY MOVER
heavy duty dolly

- Load capacity to 100,000 lbs.
- Top plate swivels, 360° directional control
- Nothing to wear out—nothing to maintain
- Two 4-inch roller bearing cast iron dollies

MIGHTY MOVER CO.

1478 S. Milwaukee St. • Denver 10, Colorado

For more data circle 560 on Reader Service Card

new shop equipment . . .

ing medium makes the indicating pointer immune to vibration other than within the fluid itself.

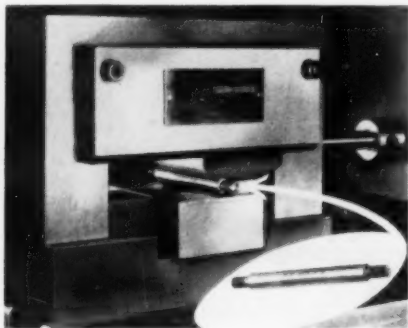
For more data circle 126 on Reader Service Card

★ ★ ★

MARKER OPERATES IN CONJUNCTION WITH SHAPER RAM

Identified as the "Shapo-Marker," a simple but efficient unit designed for marking round or tubular pieces in conjunction with the ram of a shaper has been developed by M. E. Cunningham Co., 1051 Chateau St., Pittsburgh 33, Pa. The marking machine is composed of a main fixture which is locked into the vise of the shaper and a shaft which is mounted in the tool post of the ram. The shaft is connected to the hardened steel block used to apply pressure and push the round piece being marked across the marking dies. When tubular pieces are being marked, an arbor is required so as to prevent distortion.

The marking dies are set in the base of fixtures and can be either solid or insert style. Replaceable hardened and ground plates are used to set the depth



Cunningham "Shapo-Marker" Marking Machine

of marking. Needle bearings are included in the fixture above the steel block so it can move freely back and forth during stamping operations. A single stroke of the Shapo-Marker completes marking of the part. The fixture also can be used for stamping flat parts by providing a roller instead of a flat block.

For more data circle 127 on Reader Service Card

★ ★ ★

CUT-OFF MACHINE CUTS 2,000 PIECES OF TUBING PER HOUR

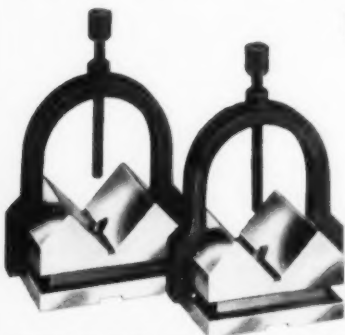
For cutting tubes in small diameters of from $\frac{3}{8}$ to $1\frac{1}{4}$ inches, Continental Machine Co., 1952 N. Maud Ave., Chicago 14, Ill., has announced a bench model tube rotary cut-off machine which is said to be capable of producing up to 2,000 cuts of metal tubes per hour, depending on the diameter, wall thickness and length. According to the



Continental Bench Cut-Off Machine in use

manufacturer, the machine parts the material leaving a smooth, clean edge. The tempered alloy steel, guard-protected 7-inch diameter cutting wheel is driven by a $\frac{1}{4}$ -h.p., 115-volt, a.c., gear head motor which is operated by an overload protected starting switch. In operation, the cut-off wheel rotates at

accurate to .0002" over 6"



UNI-V-BLOCKS

by Precision Tool

This block is guaranteed accurate to a tolerance of .0002"

T.I.R. in the following ways:

HOLE CENTER	All are accurate to each other to within .0002"
KEYWAY	
SIDES	over a matched pair.
THE V	Dimensionally stabilized!

Shown here is MODEL No. 3000
($2\frac{7}{32} \times 4\frac{1}{4} \times 2\frac{1}{16}$ ")

UNI-V-BLOCKS are also available as:

MODEL 5000 ($14\frac{9}{16} \times 5\frac{1}{8} \times 5\frac{3}{8}$ ")
MODEL 1250 ($1\frac{1}{4} \times 1\frac{1}{4} \times 1\frac{1}{8}$ ")

PRECISION TOOL AND MFG. CO. of ILLINOIS

1305 S. Laramie Avenue, Cicero 50, Illinois

Attach this ad to your letterhead for FREE literature!

MM-1

For more data circle 561 on Reader Service Card

new shop equipment...

approximately 300 r.p.m., descends to contact the tube as the handle is lowered, and spins the tube on hardened rollers. Chief speed advantage lies in the fact that the wheel-cutting action is through the wall thickness rather than the entire diameter of the stock.



WADE ENVELOPES
protect
Shop Orders, Drawings,
Blueprints, Etc.

Two styles. No. 2 with fibre back, No. 3 transparent both sides. Non-inflammable acetate windows. Special style or size to order.

Write for details.

WADE INSTRUMENT COMPANY
Dept. M, R.F.D. No. 1, Chardon, Ohio

For more data circle 562 on Reader Service Card

BOYAR-SCHULTZ
Precision-made
ALLOY STEEL



T-SLOT BOLTS

For MAXIMUM EFFICIENCY
and PROLONGED MACHINE LIFE

ACCURACY of costly machine tools may be ruined using ordinary bolts of soft steel. It is low cost insurance to use Boyar-Schultz precision made T-Slot bolts. Made from heat treated, Alloy steel, heads machined at right angle to shank, to present a broad, flat surface to upper surface of T slots. Class 3 threads do not strip or distort. For best results use Special Nuts and Washers.

BOYAR-SCHULTZ CORPORATION
2020 SOUTH 25TH AVE., DEPT. F-8, BROADVIEW, ILL.

For more data circle 563 on Reader Service Card

The unit is furnished as a complete assembly, consisting of the cut-off machine, mounting stand and adjustable tube support table equipped with five dual-roller forks. For special installations, the machine and component parts may be supplied separately.

For more data circle 128 on Reader Service Card

★ ★ ★

DOUBLE-EDGE HACK SAW BLADE

G. W. Griffin Co., Franklin, N. H., has announced a double-edge hack saw blade which is designed to handle all thicknesses of metal cutting. One edge of the blade has 18 teeth per inch for general heavy cutting, such as bolts, pipe and rod. The other edge features 24 teeth per inch for cutting thin sections, including sheet metal, light tubing, thin wall conduit, and so on. This provides a means for heavy and light cutting to be performed all on one blade. The double-edge blade is individually carded and cutting edges are identified.

For more data circle 129 on Reader Service Card

★ ★ ★

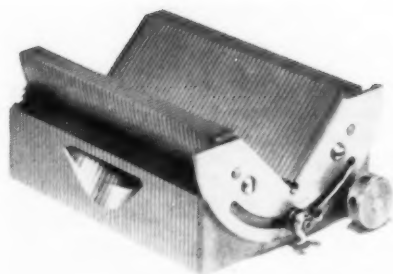
V-BLOCK IS BOTH MAGNETIC AND ADJUSTABLE

Designed to aid toolmakers and production men in setting up grinding jobs, a magnetic V-block which is both mag-

EARN \$1000 MONTH

TOOL AND DIE DESIGNERS ARE IN DEMAND —and Acme is the only school in America offering complete tool and die design training — Acme graduates step right into responsible, high-paying positions. NOW you can take the same course taught in our resident schools by CORRESPONDENCE in your spare time. Training made sure and easy through our famous Cope System. If you can finish high school, you can master this profession! Prepare for a career in an \$8000-\$15000 yearly salary bracket—write today to ACME SCHOOL OF DIE DESIGN, Corres. Div. MM, 8 N. Jefferson Street, Dayton 2, Ohio. Approved under PL550 for Korean Veterans training.

For more data circle 564 on Reader Service Card



Anton Magnetic Adjustable V-Block

netic and adjustable has been announced by Anton Machine Works, 1226 Flushing Ave., Brooklyn 37, N. Y. The V-block is made of alternating laminations of non-magnetic brass strip and material with high permeability and

low residual magnetism. All laminations are said to match perfectly and will not shift since they are held without pins or rivets. The V-block can be quickly set because of the elimination of sine bar, gage block and indicators. Further, it can be installed and removed without any chuck adjustment, and may be used for flat work of a larger area merely by using an inverted-V, laminated insert.

The V-groove is said to be precision ground to a 90-degree angle, parallel to the base and sides of the bottom block to within a plus or minus 0.00005 inch over the entire length. The vernier is graduated to 5 minutes, and vernier settings are accurate to 15 seconds. The magnetic adjustable V-block can also be used on drill presses and other machines equipped with magnetic chucks.

*You Can
Rely on a*

ROUSSELLE



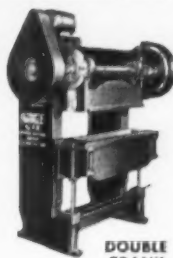
**DEEP
THROAT
PRESS**



**HORN
PRESS**



O.B.I. PRESS



**DOUBLE
CRANK
PRESS**

THESE 40-TON PRESSES

take job after job in stride and give you top speed and uniform output on a variety of work. They stress simplicity in every detail to achieve quicker set-ups, easier changeovers and simpler operation. All are extra rugged, high precision units, made to withstand hard usage and assure long, satisfactory service. They are **very moderately priced.**

Manufacturers of Rousselle Presses

SERVICE MACHINE CO. 2310 West 78th Street • Chicago 20, Ill.

Significant savings may result if you let our engineering staff assist you. There is no obligation.

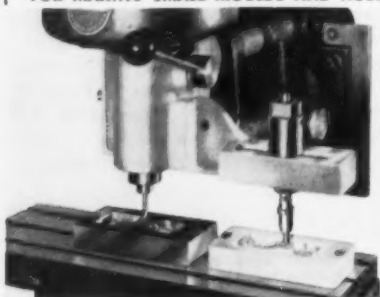
• *Rousselle Presses are sold exclusively through leading machinery dealers.*

• *Choice of 25 models in 5 to 40-ton sizes.*

For more data circle 565 on Reader Service Card

RECOR DIE SINKING HEAD

DON'T TIE UP YOUR LARGE MACHINES
FOR MAKING SMALL MOULDS AND HOBS



Mounted on Benchmaster. Mould was made by line by line milling. 1-to-1 ratio. Maximum distance from stylus to cutter is 8 1/2". PUT 1" SPINDLE TRAVEL ON YOUR VERTICAL OR HORIZONTAL BENCHMASTER, DIAMOND OR CLAUSING MILL, ETC.

Milling head alone \$65.00. With stylus arm \$89.00.
Shipping weight approx. 40 lbs. F.O.B. L.A.

See your dealer or write to us.

RECOR MFG. CO.

8237 Teesdale Ave., North Hollywood, Calif.

For more data circle 566 on Reader Service Card

MARK and DEMAGNETIZE IN ONE OPERATION

THE
Luma
TOLEDO, OHIO
WAY



The Luma combination etchtool and demagnetizer, etches, demagnetizes, anneals and solders. Permanently marks hardest steel with ease of a pencil. Write for complete information.

Luma Electric Equipment Co.

P. O. BOX 132-MS

TOLEDO 1, OHIO

For more data circle 567 on Reader Service Card

new shop equipment...

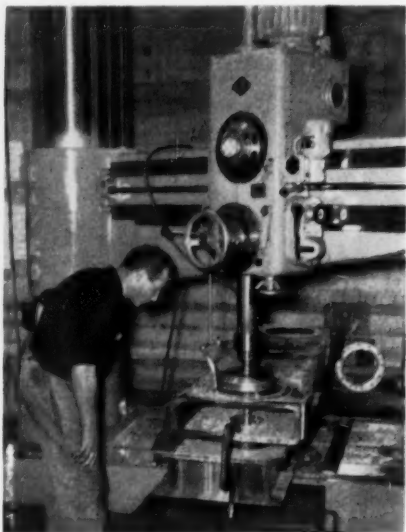
It is especially useful in toolroom and layout work, and for high-quality, close-tolerance production work.

For more data circle 130 on Reader Service Card

★ ★ ★

RADIAL DRILL IS AVAILABLE IN WIDE RANGE OF SIZES

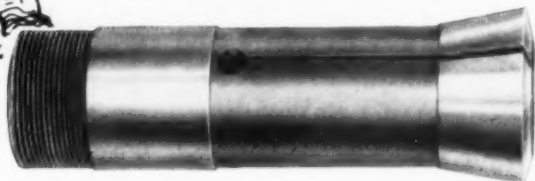
Maserati Corporation of America, Westbury, N. Y., is now marketing the Caser Radial Drill which is available in a wide range of sizes from the FR-11 with a 2-foot 6-inch arm and 8-inch column diameter, to the FR-9 with an 8-foot arm and 22-inch column diameter. The machine features single push-button clamping of the column and head, as well as single control for power arm elevation. The arm is always clamped when the lever is in the neutral position and automatically un-



Caser Radial Drilling Machine in use



SPECIALISTS in draw-in collets



STOCKED IN STANDARD
STYLES FOR IMMEDIATE
DELIVERY

Draw-In Collets—Lathes, grinders, millers, fixtures.
Fractional round sizes, decimal equivalents from
1/64" to capacity; square, hexagon and taper holes.

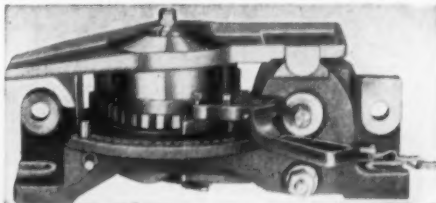
Write for Bulletin 100E. Valuable information
on standard draw-in collets and step chucks.

RIVETT LATHE & GRINDER, INC., Dept. MMCI, Brighton 35, Boston, Mass.



For more data circle 568 on Reader Service Card

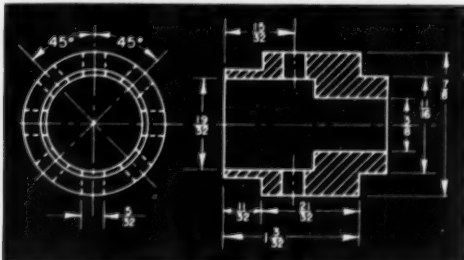
CUT COSTS ON SECONDARY OPERATIONS WITH THE DEARBORN AUTOMATIC CHUCKING AND INDEXING FIXTURE



Features:

1. Work held by collets
2. Automatic opening and closing
3. Work automatically ejected
4. Automatic indexing if required
5. Three models with capacities from 1/32" to 2"

Write for illustrated data.
Send blueprints or specifications
of work.



This piece was made from Brass. It was necessary
to drill all holes from the outside to minimize the
burring time. Production was about 100 pieces per
hour or 800 holes per hour.

J. W. DEARBORN
ANSONIA • CONN.

For more data circle 569 on Reader Service Card

new shop equipment . . .

clamps and lifts or lowers when the lever is pushed up or down. The roller mounted head is said to move easily on the arm.

The machine utilizes a single control

CAM MILLING
JIG BORING



A SPECIALIZED CAM
MILLING SERVICE,
JIG BORING
SPOT WELDING
CONTRACT PRODUCTION
EXPERIMENTAL DEVELOPMENT

SEND FOR NEW CATALOG NO. 52-CM

EISLER ENGINEERING CO., INC.
734 S. 13TH ST., NEWARK 3, N. J.

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**MASTER GRIPPING
CLAWS System Hubner**
WHY use them?

1. Clamping action Vertical as well as Horizontal—pressing workpiece down directly on the machine table. No hammering and still no air between.
2. Gain more working room.
3. Faster and more secure setups. Easier to handle.
4. Unlimited jaw opening.
5. No straps overlapping on the workpiece, more machining surface.
6. Extremely versatile—take light cuts or heavy cuts, use on small machines or heaviest production machines.

Exclusive Agents
KARL A. NEISE
404 - 4th Ave.
N. Y. 16, N. Y., Dept. MMS

For more data circle 571 on Reader Service Card

for spindle start, stop and reverse, combined with preselection of all available speeds while the machine is running. A speed dial with direct reading of spindle speeds provides for preselection of the next speed while the machine is performing the first operation. A feed dial with direct reading of all available feeds can be operated while the machine is running and the feed is engaged. The smallest size machine has 8 spindle speeds ranging from 205 to 2,300 r.p.m., and the largest machine has 24 spindle speeds from 30 to 2,000 r.p.m. A preselector speed permits change of the spindle speed quickly and safely so the operator can easily select the correct speed even for short operations.

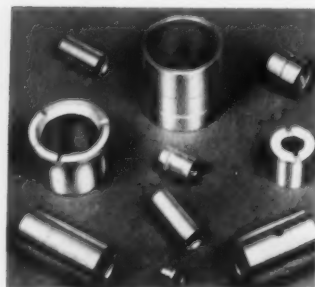
The machine incorporates a positive feed clutch which engages with fingertip pressure at any position. A graduated disc permits automatic regulation of the depth of the hole being drilled. A special feed safety device safe-guards vital parts of the machine from damage which usually results from overloading.

For more data circle 131 on Reader Service Card

★ ★ ★

CYLINDRICAL AND THREAD GAGES

Standard Tool Co., Cleveland, Ohio, has announced the addition of a complete line of cylindrical and thread



Superior

BRONZE BUSHINGS

- Shipments as promised.
- Laboratory Quality Control.
- Rapid quotations.
- Savings from a policy of no salesmen or representatives.
- Savings from a fully mechanized foundry and machine shop.

- Bushings made exactly as you want them.
- Emergency service when you need it.

LEADING SUPPLIER TO LEADING USERS

Superior

BRASS WORKS, INC.
312 South Crawford Street
Detroit 17, Mich., VI 1-4322

For more data circle 572 on Reader Service Card

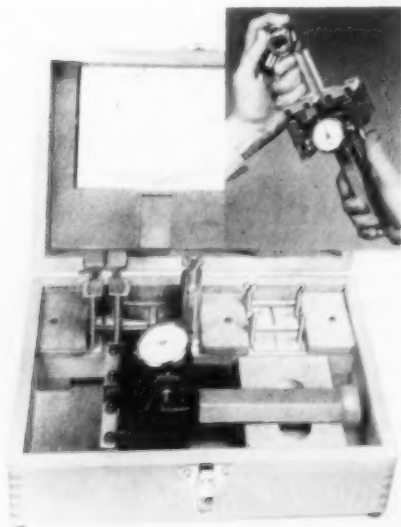
gages, both plug and ring, to supplement its comprehensive line of rotating cutting tools.

For more data circle 132 on Reader Service Card

★ ★ ★

PORTABLE GROOVE GAGE IS AVAILABLE IN PACKAGE UNIT

Bryant Gage & Spindle Division, Bryant Chucking Grinder Co., P.O. Box 620-D, Springfield, Vt., has announced that its portable groove gage is now available in a low-cost package unit complete with sets of segments. The groove gage has no bearings or slides to wear. All the motion is confined to spring steel reeds. The segments move radially to engage the groove diameter; the nose bears vertically on the bottom face of the groove. According to the manufacturer, the dial indicator gives fast, simple determination of rejects or acceptable parts within specified tolerances.



Bryant Package Portable Groove Gage Set

January, 1956



WE INVITE COMPARISON



BUY THE BEST
FOR LESS!

Queen City

grinders and buffers

You save when you buy and when you use **QUEEN CITY Grinders and Buffers**. Priced 20 to 30% under competing tools, they're built to stand up under the hardest use. Extra heavy spindles, extra duty ball bearings and special motors all contribute to long, low-cost service. 30-Day Trial Offer!

There is a complete range of **QUEEN CITY Grinders and Buffers** . . . floor and bench types . . . in sizes from $\frac{1}{2}$ to 10 H.P.

Write For Free Catalog Today!

QUEEN CITY MACHINE TOOL CO.
3911 Kelllogg Ave. - Cincinnati 26, Ohio
"High Quality - Low Cost - For Over 40 Years"

For more data circle 573 on Reader Service Card
modern machine shop 325

new shop equipment . . .

The new kit contains eight pairs of segments. Four basic pairs serve O-ring grooves through 5 inches in diameter; the other four check snap ring grooves up to 5 inches in diameter. Convenient dove-tail clamps give each pair of segments a 2-inch adjustment range. As a result, the portable groove

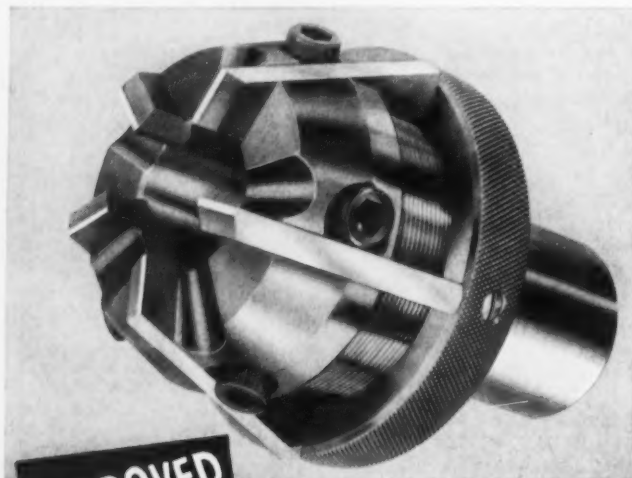
gage can be used in an unusually wide range of applications. Special groove segments are also available.

For more data circle 133 on Reader Service Card

★ ★ ★

WORK POSITIONER FEATURES REMOTE TOUCH CONTROL

Designated as the "PowRarm" No. 393, an air-powered hydraulic work positioner which features remote touch control instead of manual tightening of a control knob has been announced by Wilton Tool Mfg. Co., Inc., 9525 Irving Park Rd., Box 56, Schiller Park, Ill. The primary source of power is compressed air at 60 to 100 p.s.i. The factory air system is connected through a foot pedal into an air-hydraulic booster cylinder. Air pressure is multiplied



IMPROVED

GENESEE Adjustable Hollow Mill

There is a size and style Genesee for every hollow milling job. Standard sizes from 0 to 2", standard with straight or Morse Taper shanks carried in stock.

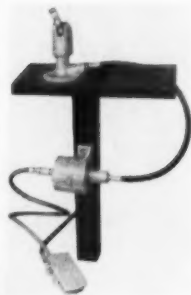
- Quick — easy adjustment
- Simple sharpening method
- High speed steel—cast-alloy —Carbide tipped blades
- Let our Engineering Department solve your Production tool problems

WRITE FOR CATALOG 54M

GENESEE MANUFACTURING COMPANY

566 HOLLENBECK ST. • ROCHESTER 21, N. Y.

Adjustable Hollow Mills • Facing and Counterboring Tools • Special Production Tools



Wilton "PowRarm"
No. 393 Work
Positioner

For more data circle 574 on Reader Service Card

and converted to hydraulic pressure, which is transmitted through a shielded hose into the body of the positioner.

The "PowRarm" contains a universal ball-and-socket arrangement free to move through all three planes. At the touch of a toe, the operator locks the positioner in any desired angle and position; reversing the foot pedal releases the air pressure from the system, freeing the positioner and enabling the

work to be rotated to any new position. The unit has a work weight capacity of 105 pounds.

For more data circle 134 on Reader Service Card

★ ★ ★

DOUBLE-ROW BALL BEARING

Identified as the "Versa-Twin," a double-row unground ball bearing with

★ ★ ★ ★ ★
SAVE!

WITH A HANNIFIN AIR PRESS

It's the ideal press for that occasional pressing job. These presses operate off ordinary shop air supply. They're fast and safe. Over 30 models to choose from...many for either bench or floor mounting. Capacities from ½ to 18 tons. Daylight to 46 inches...reach to 12 inches. Prompt delivery.

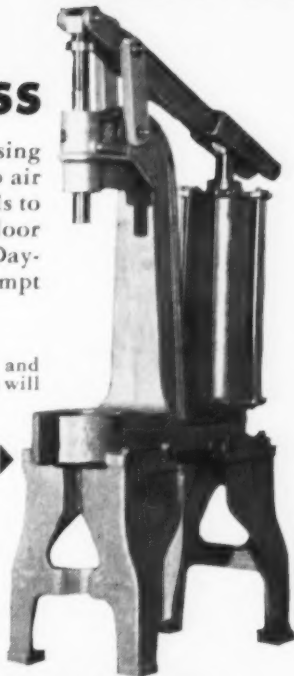


WRITE. Complete information and prices on Hannifin Air Presses will be sent on request.

6 Tons (Model B-2) One of more than 30 models. Press with base, \$554.

1-ton Hand-D-Press. For small parts manufacturers. Press, \$232.

Prices F.O.B. our press plant, St. Marys, Ohio, subject to change without notice.



HANNIFIN

HANNIFIN CORPORATION, 565 S. WOLF ROAD, DES PLAINES, ILLINOIS

For more data circle 575 on Reader Service Card

new shop equipment . . .



Various applications of Hartford "Versa-Twin" Double-Row Unground Ball Bearings

high performance and controlled tolerances in which parts of the end product are used to form the inner and outer races has been announced by The Hartford Steel Ball Co., 12 Jefferson Ave., West Hartford 6, Conn. Because each "Versa-Twin" bearing application is made to specific product requirements, applications are practically unlimited but must be engineered into the redesign of an existing product or into the design of a new product. With the bearing, the inner race can be the customer's product shaft, an adaptation

of it, or a shaft fitted by a part by means of screw, snap ring, rivet, spot-weld or knurled press. The outer race can also be a functional component of the product.

According to the manufacturer, the bearing offers unusual stability and is double-acting, because it can carry both the radial load and the thrust load in both directions, locking the moving parts into the desired axial position. The "Versa-Twin," it is claimed, can also be used as a single bearing to support motor shaft or drive shaft; can handle eccentric loads; can be used as a pressing roller; can be used as a complete axle and housing; can provide captive rollers in sliding applications; can function in a pivot application normally requiring two pivot bearings and a shaft; and can be flanged to provide an outboard bearing. The bearing can be made of practically any material or combination of materials, and there is said to be no definite limits on size.

For more data circle 135 on Reader Service Card

★ ★ ★

**READY-WOUND
COMPRESSION SPRINGS**

Compression springs made from music wire, ready-wound in 26 different sizes ranging from 0.032 to 0.115 inch in diameter, have been announced by Reid Tool Supply Co., Muskegon Heights, Mich. The springs are all 10



for rapid threading

OF SCREW BLANKS AND SIMILAR PARTS

The KENT 2-Spindle BOLT THREADER

Alternate feeding to two spindles. Continuous operation. Large output. Low costs. Change-overs made quickly. Minimum skill required. Write for illustrated literature.

The KENT MACHINE CO., Cuyahoga Falls, Ohio

Drillers • Threaders • Slotters • Countersinkers • Bar Painters

For more data circle 576 on Reader Service Card



Reid Ready-Wound Compression Springs

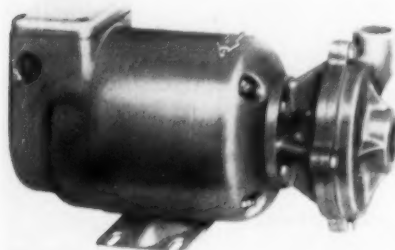
inches long and are designed to fit into holes and over rods according to the diameter. Simply select the size spring required, cut to length and you have a spring for the particular job, thus eliminating the winding of springs by hand. Compression springs are also available, made from music wire, in 30 different smaller sizes.

For more data circle 136 on Reader Service Card

★ ★ ★

CENTRIFUGAL PUMP HAS SELF-ADJUSTING PRETESTED SEAL

Designated as the Model D-500, a small 1/20-h.p. centrifugal pump has been developed by The Ruthman Machinery Co., 1817 Reading Rd., Cincinnati 2, Ohio. The unit, equipped with a self-adjusting pretested seal, is designed for use in closed, semi-closed or open systems and can be mounted at any convenient point, either in a horizontal, vertical or angular position,



Rumaco Model D-500 Centrifugal Pump

January, 1956

*It's Super Safe...
It's Super Sharp...
It's Super Strong*

**IT'S THE HAND
HACK SAW BLADE THAT
WILL NOT SHATTER!**

Twin to Disston's famous non-shatterable machine blade, here's the hand hack saw blade that meets your rigid requirements for safety.

It's shatterproof—made of high speed steel with hardened cutting edge, a super-safe blade that combines the long cutting life of high speed steel with maximum flexibility.

Ask your Disston distributor today for a demonstration of this new super-safe blade with Disston's No. 368 frame.

Henry DISSTON DIVISION

H. K. Porter Company, Inc.

000 Tacony, Philadelphia 35, Pa.

Other factories and branches:
Toronto, Ont.; Seattle, Wash.; Chicago, Ill.

A PLEDGE from Henry DISSTON DIVISION.

Today as a proud division of H. K. Porter Company, Inc. we pledge ourselves to continue to provide the fine tools and fine steel for which the Disston name has been famous for over a century. You can count, too, on outstanding service from our engineering and distributors' staffs.



For more data circle 577 on Reader Service Card

modern machine shop 329

new shop equipment . . .

without restriction to the high level line of the liquid in the reservoir.

According to the manufacturer, the discharge relation is interchangeable in four 90-degree positions. The pump is very compact and simple in construction, and is available in either cast iron or bronze. A one-piece motor shaft, which rotates on two generous-size pre-

cision ball bearings, extends through the seal to the pump housing, in which no bearings are employed.

For more data circle 137 on Reader Service Card

★ ★ ★

FACE MILL BODY UTILIZES STANDARD HOLDERS AND CARBIDE INSERTS

Nelco Tool Co., Inc., Manchester, Conn., has announced a Lifetime Face

Mill Body which is designed to accommodate industry standard holders and "throw-away" carbide inserts to completely eliminate regrinding. The lifetime face mill body is precision engineered with built-in adjustments to accommodate standard tool bits with disposable carbide blanks, each blank having six engineered cutting edges which can be changed in seconds. The carbide cutting blanks are industry standard

HERE'S THE ANSWER TO YOUR TOUGHEST CUTTING PROBLEM



model B
Metal Cutting
Band Saw
(Wet or Dry)

FEATURES

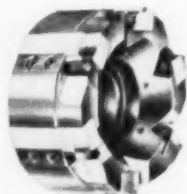
- Large Capacity
- Portability
- Light Weight
- 3-Point Suspension
- Operational Safety
- Centralized Controls
- Speed and Accuracy
- Lowest Cost

The Johnson Model B . . . the only light and semi-portable metal cutting band saw with wide-range heavy duty capacity. The versatile Model B is fast—accurate and economical, it easily handles 5" rounds and 10" flats with automatic precision. It's available in the standard Dry or Wet models to suit the need and can be caster equipped for plant portability. See for yourself, why Johnson Saws are preferred—everywhere! Write today for catalog and name of local dealer.



Johnson MANUFACTURING CORPORATION
MAIN PLANT: 1011 BARNES ST.
ALBION, MICHIGAN

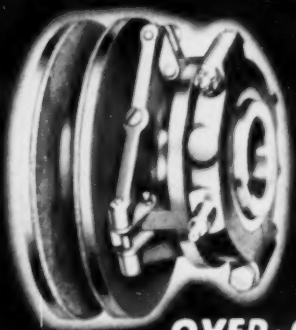
For more data circle 578 on Reader Service Card



Nelco Lifetime Face Mill Body equipped with standard holders and carbide inserts

ROCKFORD

LIGHT



OVER-CENTER

SMOOTH ENGAGEMENT

COMPACT DESIGN

POWERFUL PULL

SMOOTH ENGAGEMENT *

UNIFORM PRESSURE

FINE ADJUSTMENT

ACCURATE BALANCE

LONG SERVICE LIFE

* The smooth-operating toggle action slides the drive plate along the accurately machined collar, applying the pressure evenly — and directly opposite the facing. The clutch plates are steel and the facing is specially selected for its firm grip, long wear and non-grab qualities.

Send for This Handy Bulletin

Shows typical installations of ROCKFORD CLUTCHES and POWER TAKE-OFFS. Contains diagrams of unique applications. Furnishes capacity tables, dimensions and complete specifications.



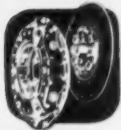
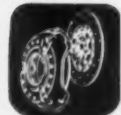
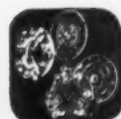
ROCKFORD CLUTCH DIVISION BORG-WARNER
▲ 300 Catherine Street, Rockford, Illinois, U.S.A. ▲

CLUTCHES

For more data circle 579 on Reader Service Card

January, 1956

modern machine shop 331



new shop equipment . . .

and are available from any carbide manufacturer. A turn of a socket wrench provides a new cutting edge which is in place and automatically aligned to run and cut true.

For more data circle 138 on Reader Service Card

★ ★ ★

SHUTTLE-TYPE CONVEYOR FOR INDUSTRIAL USE

Industrial Filtration Co., Dept. J-294, 13 Industrial Ave., Lebanon, Ind., has announced the Delpark-Jamesway Shuttle-Type Conveyor which operates on a single level without the necessity of a second level return. According to the manufacturer, the conveyor is adaptable to many installations and is designed for many types of material handling. The simplified design is said



Delpark-Jamesway Shuttle-Type Conveyor

LESS DOWN TIME

means...

INCREASED
PRODUCTION
GREATER
EFFICIENCY

LOWER COSTS

SAVAGE TYPE "S" CUTTING TOOLS AND DIES, made of high-carbon, high-cobalt, special high-speed steel, are designed . . .

- FOR LONG LIFE
- TO SHRINK YOUR COSTS
- TO INCREASE YOUR PRODUCTION

PATENTED SAVAGE TOOL-HOLDER permits repeated sharpening with easy tool-length adjustment.

"SAVAGE NIBBLING MACHINES NIBBLE YOUR COSTS"

Quotation on Request

W. J. SAVAGE CO.

NIBBLING MACHINE PIONEERS
Knoxville Since 1885 Tennessee



For more data circle 580 on Reader Service Card

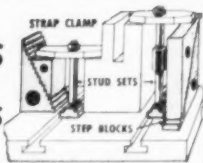
to make it virtually foul-free. The conveyor operates within a trough or trench. A mechanically or hydraulically-operated shuttle drive-bar rests on the bottom at either side or center. Hinged to the drive-bar at intervals are blades which open to the width of the trough as the drive-bar starts its forward movement. The blades advancing with the drive-bar move material in

SURE GRIP STEP BLOCKS STUD SETS

STRAP
CLAMPS

DEPT. SB-1

TIETZMANN TOOL CORPORATION
ENGLEWOOD OHIO



For more data circle 581 on Reader Service Card

THE **CORRECT** BLANCHARD WHEEL
GETS YOUR NOSE OFF THE GRINDSTONE

... WITH **BEST SURFACE
GRINDING RESULTS!**



BLANCHARD SURFACE GRINDERS give you peak production and economy when maintenance is performed on schedule, and when you use the best wheel for each job.

For more than 25 years, Blanchard has been making wheels that do their jobs in less time, with less trouble and cost . . . whether the work is tough as copper or fragile as glass . . . whether it requires heavy roughing cuts or clean-up cuts with flatness of .000005" to .000010" and finish of 1 to 3 micro-inches.

Our quarter century of experience has proven that Blanchard grinders perform best with Blanchard wheels...on every job!

SEND

FOR OUR NEW,
FREE FOLDER
on Blanchard cylinder,
sector and
segment wheels —
in silicate, resinoid
and vitrified bonds.

PUT IT ON THE



THE BLANCHARD MACHINE CO.

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Gentlemen:

☐ Please send new *Blanchard Wheel and Segment folder*.

NAME _____

TITLE _____

FIRM _____

STREET _____

CITY _____ ZONE _____ STATE _____

For more data circle 582 on Reader Service Card

new shop equipment . . .

the trough to the maximum forward stroke of the drive-bar. As the movement is reversed, the blades fold back against the drive-bar and by-pass the material advanced by the blade in back.

CENTERLESS GRINDING

Brown & Sharpe and Swiss Automatic screw machine parts, aircraft and standard, heat treated and ground if necessary. Send blue prints for estimates. 27 years serving industry. The Porter Machine Co., Cincinnati 9, Ohio.

For more data circle 583 on Reader Service Card

GRIND THE *Eastern Centerless Way*

Our new plant with
increased facilities
assures

PROMPT SERVICE

Eastern Centerless Grinding Co.
470 Tolland Street East Hartford 8, Conn.

For more data circle 584 on Reader Service Card

As the forward stroke is again began, the blades open and advance the material in successive steps.

The Delpark-Jamesway Conveyor is available by the foot and engineered to the job. Trough and blade widths are in 2-inch progressive sizes from 6 to 30 inches. The conveyor is claimed to be practical for installations of great length with extremely low head room requirements. Stroke can be adjusted hydraulically to advance fast and return slower or to advance slow and return fast. Units can be made for portable use or stationary installation.

For more data circle 139 on Reader Service Card

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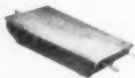
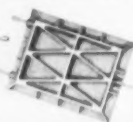


MILWAUKEE *Precision* EQUIPMENT

Designed and finished for true dimensional accuracy. Highest grade semi-steel.

Catalog sent upon request.

**SURFACE PLATES — ANGLES —
PARALLELS — STRAIGHT EDGES**



J. C. BUSCH COMPANY

Engineers and Machinists Since 1907
158 S. BARCLAY STREET — MILWAUKEE 4, WIS.

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Get the complete, revealing

Inside Story

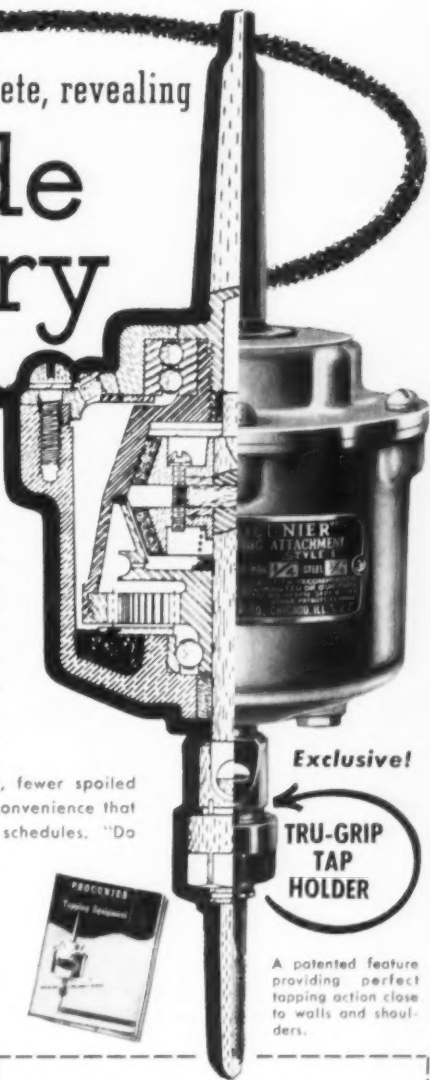
on the finest
tapping heads ever made!

Here's a feature by feature analysis on the amazing Proconier tapping line which clearly explains why they have consistently maintained tapping superiority in the industry for over 30 years! A true "peep-hole" story on the many outstanding construction improvements, the mechanical advancements and precision quality operating advantages that make Proconier heads a "must" in production plants everywhere! You'll learn why Proconier means more tapping hours with a minimum of "down-time" interruptions, accelerated production with fewer broken taps, fewer spoiled pieces and a "new-found" operating ease and convenience that helps operators maintain stepped-up production schedules. "Do more tapping, better, for less" is the slogan in progressive plants who have adopted Proconier heads in their tapping departments.

**Find out how you, too, can benefit
with Proconier — Write for Free
Brochure Today**

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SAFETY CHUCK COMPANY**

12 S. CLINTON ST., DEPT. 1
CHICAGO 6, ILL.



Exclusive!

**TRU-GRIP
TAP
HOLDER**

A patented feature
providing perfect
tapping action close
to walls and shoul-
ders.

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Address _____

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For more data circle 585 on Reader Service Card

where to get it

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Get Into Production Quicker on Every Job



Buck



AIR CHUCKS

You can save from several minutes to many hours on every set-up for your chucking machines with the Buck Adjust-Tru power chuck.

Jaws can be machined in the tool room—and hardened if you wish—since there is no need for extra machining on the turret lathes to fit jaws to the work. Final accuracy adjustments are made by the chuck . . . *in a matter of minutes* . . . holding work under full air pressure!

Jobs can be run intermittently *without re-truing jaws*. On new runs and re-runs accuracy within .001" is guaranteed.

You can make drastic cuts on down-time with Buck air chucks. Write for full details today.

Hardened Key Ways Standard Feature

Hardened key ways of the Buck, combined with hardened jaws, let you run thousands more pieces (holding tolerances within .001") than conventional chucks. You can use hardened jaws for all operations since final accuracy adjustments are made by the chuck. No need to grind and fit jaws on the chucking machine. Hardened key ways are a *plus* feature of the Buck, at no additional cost.

Buck Air Chucks are made in 6", 8", 10", 12" diameters—2 or 3 jaws. NO PRICE PREMIUM.

BUCK TOOL COMPANY

114 SCHIPPERS LANE • KALAMAZOO, MICH.

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There's an **IDEAL**
LIVE CENTER
 to do YOUR job best!

**STANDARD MODELS IN A COMPLETE
 LINE DELIVERED FROM
 DISTRIBUTORS STOCKS!**

When you choose IDEAL Live Centers you seldom have to resort to "specials" and the slow delivery and inventory problems they involve. You can handle practically any turning job with a *standard* IDEAL Live Center.

Top performance is also "standard" with IDEAL Live Centers. They have proven their accuracy and long life in tough service in shops all over the country where they are first choice! When you need a live center, you'll get the one you want, when you want it, easiest, from the complete IDEAL Line, stocked by your IDEAL Distributor.



UNIVERSAL

Accuracy to plus or minus .0001". Unusually high load capacity up to 5200 lbs. at 50 RPM. Morse tapers 2, 3, 4 and 5.*



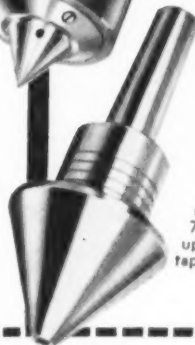
MULTI-DUTY

Interchangeable male, female and pipe points for centered and un-centered work. Nine sizes: Morse tapers 1 through 5, as well as straight.* Loads to 1500 lbs. at 100 RPM.



HEAVY DUTY

For close tolerance turning jobs to 22,000 lbs. at 50 RPM. Eccentricity less than .0002". Morse tapers 4, 5, 6 and 7.*



NEW

**PIPE POINT
 LIVE CENTER**

For heavy turning work on pipes and other large, hollow cylinders. Sizes range from 3" diam. to 7 1/2" diam. Load capacities up to 22,000 lbs. Morse tapers 3, 4, 5, 6 and 7.*

***IDEAL LIVE CENTERS ARE ALSO
 AVAILABLE IN BROWN &
 SHARPE AND JARNO TAPERS**

Sold through Leading Distributors
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IDEAL INDUSTRIES, Inc.
 1031 Park Avenue, Sycamore, Illinois



Please send free catalog data on IDEAL Live Centers

NAME.....

COMPANY.....

ADDRESS.....

CITY.....ZONE.....STATE.....

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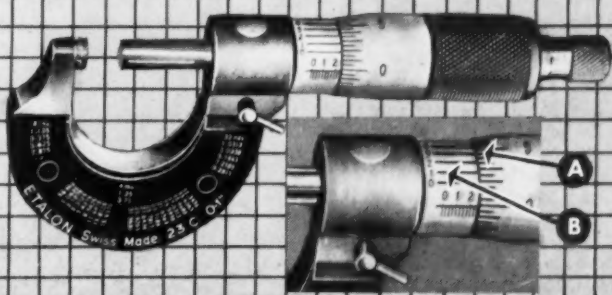
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Car door handles—Checking internal groove diameter and the relation of groove to a face.



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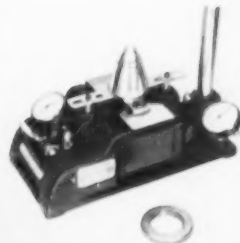
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The gaging contacts are a pair of threaded segments, which are interchangeable to cover a wide range of diameters. Both "Go Form" and "Pitch Diameter" segments are available. These segments have a much longer life than conventional plugs and rings. Attachments for checking squareness-of-face and concentricity in relation to the axis of a thread are also available.

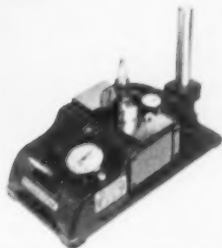
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Spark plugs—Checking an external thread and the concentricity of an angular seat to the axis of the thread.



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the last word

By Fred W. Vogel, Editor

PUSH-BUTTON PRODUCTION

On Sunday, December 18, we watched President Eisenhower push a button in Gettysburg which turned on the lights of a Christmas tree on the south lawn of the White House in Washington some eighty miles away. A few evenings before, as part of a stunt, a well known TV personality pushed a button in a Los Angeles studio which gave to a man attending a convention at a New Orleans a shocking "hot seat."

In almost every large town where housing developments are being promoted you will find at least one House of Tomorrow featuring the latest in push-button living. One super automatic demonstrator kitchen containing just about every appliance, gadget and device obtainable, we were told, costs around thirty-five thousand dollars.

Most of us enjoy our push-buttons—even to operate automobiles—because push-buttons usually mean that a job of some kind is being done safer or faster or better or with less effort than before. And we know of no single instance where people

who have been educated to the wonderful advantages of push-buttons ever seriously objected to their use.

If business men are going to be plagued by suspicious legislators who demand to investigate the motives behind the application of push-button methods of manufacturing, it is evident that an educational program is needed. Fear of the unknown will always impede progress. But fear of the effects of push-button manufacturing—automation—could delay many important and helpful developments. What can we, as individuals, do about it? Most certainly, we can take a mature attitude, an intelligent attitude. We need not take someone else's word for it. If we see advantages of push-buttons, let's emphasize them, let's talk about them.

What was the consensus on automation at the congressional hearings held by the Joint Committee on the Economic Report? Just this: Automation may displace employment on a temporary basis, but in the long run it's good for the economy and in the American tradition of technological development.

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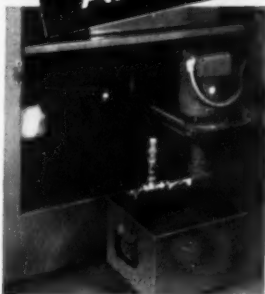
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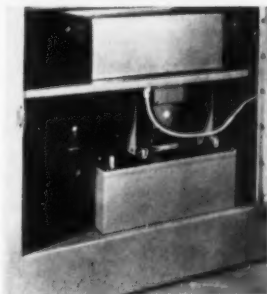
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Ruthman Gusher Coolant Pumps Are Adaptable



Illustrated is a Gusher Coolant Pump mounted on Beco Model #410 Automatic Drilling and Tapping Machine.

*Photo Courtesy
Batchelder Eng. Co., Inc.*



Gusher Coolant Pumps readily lend themselves to novel and unusual applications. On the Beco Model #410 automatic drilling and tapping machine, the Gusher Coolant Pump is mounted on roller drawer slides for quick and easy exchange of coolants. On all coolant pump problems you can depend on Gusher Coolant Pumps.

THE RUTHMAN MACHINERY CO.



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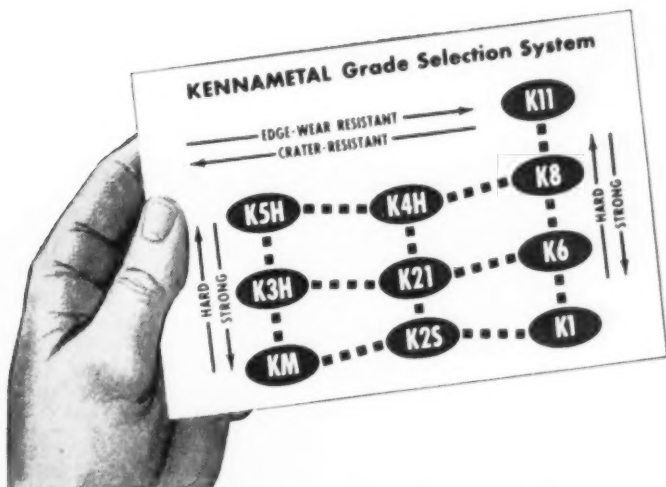
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peat performance on all types of machining operations. KENNAMETAL INC., Latrobe, Pennsylvania.

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*Registered Trademark

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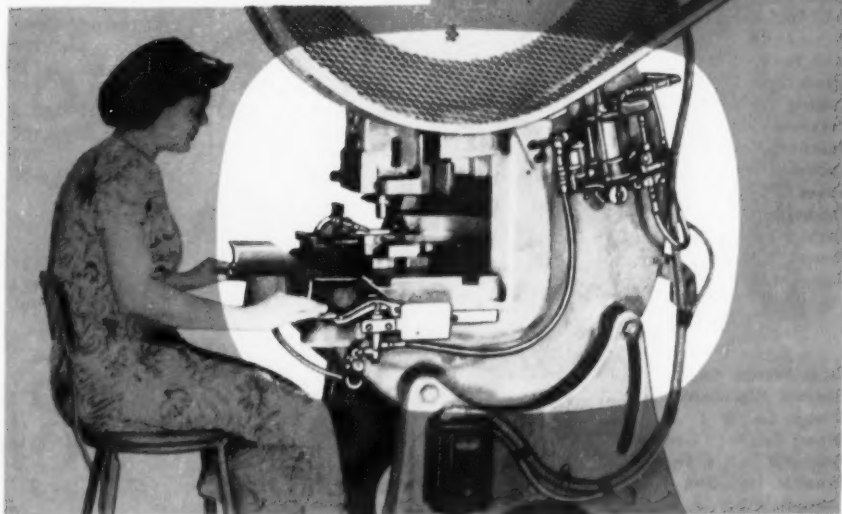
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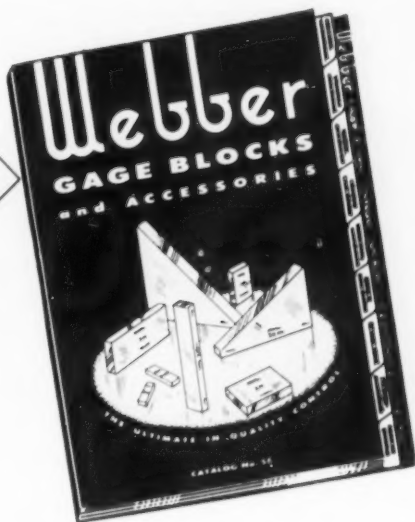
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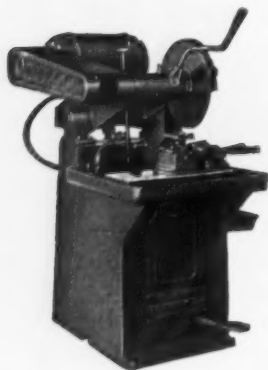
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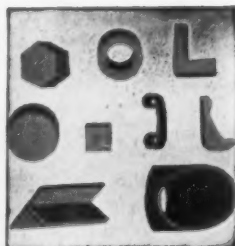
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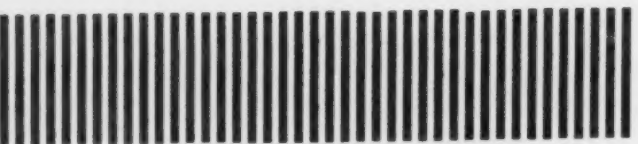
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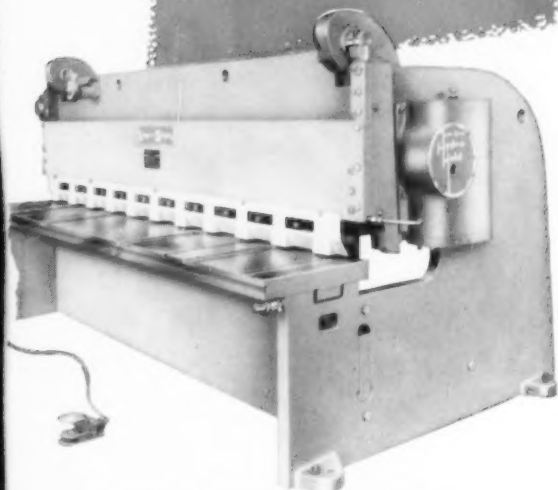
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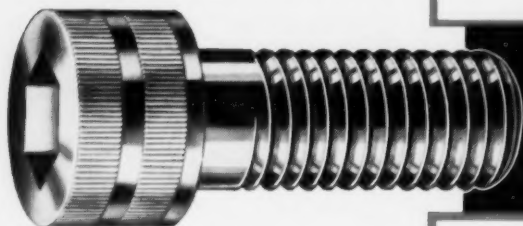
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